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CLEVELAND, O., JUNE 25, 1891.

THE WEEK IN IRON CIRCLES.

General Features. The near approach of the turn of the year is witnessing, as usual, a great deal of quiet but wholesome liquidation. Money is close everywhere, but not to the extent of causing alarm or great inconvenience. The country banks are two months ahead of time in their demands upon the money centers. The inference is that when the crops have to be moved, the demand will be less than normal. Money rates are stiffer. New enterprises depending upon financing bonds and stocks, make no progress. As to crops, the outlook continues good. The weather of the past week has, in most sections of the country, been just right for rapid growth of corn, hay and minor crops. Wheat harvest is in progress in the Southern and Southwestern range of territory, and a large yield is assured. Cotton has gained wonderfully in condition since June 1. Railroads are not expected to do anything in the purchase of material until the July interest is paid. Then, it is believed, there will be a greatly improved demand from that source. The general demand is undeniably better. Jobbing foundries are getting more work, but complain of prices. Railroad and pipe shops are rather more busy. Rolling mills are expected to run light in midsummer, but they appear to be doing a fair amount of work for the season. The agricultural implement shops are making great machinery, and running night and day to get out work on time. The volume of business at Detroit the past week has been large, and especially has this been true of Lake Superior charcoal iron, but prices have not advanced. The feeling is quite general that business for the last half year will be much more active than for the first half, yet buyers seem to be able to secure what they need at present figures. While this is true at the present time, yet an advance is liable to take place without any warning and when it is least expected. At Chicago it is noted that the usual mid-Summer dullness is beginning, this period coming earlier than in past years on account of the heavy buying done in the month of May. There is a fair demand still, however, for medium-sized lots. Prices remain practically unchanged, though on Southern cokes somewhat lower figures and longer deliveries are being made by the leading companies. Lake Superior charcoals are held at $18, Chicago, for the best known brands, but it is reported that one or two of the smaller furnaces are still cutting this price. Notwithstanding the fact that more iron is being produced than one month ago, and even with the usual Summer inactivity at hand, prices at Buffalo remain firm. There is no apparent cessation in the general demand, which continues fair, and indicates that consumption is at least not falling much behind the increased production. The tone of the market, as gathered from both consumers and producers, is conservative but hopeful. Sales at Louisville for the past week have been rather light; inquiries have run mostly for foundry grades, some of which are in scant supply, and buyers have experienced difficulty in placing orders for No. 1 foundry. Most consumers are unwilling to anticipate their wants very far ahead, claiming prospects for orders in their line do not justify it, and while they recognize prices are low, the continued closeness of the money market makes them hesitate about carrying much stock in anticipation of future requirements. At Philadelphia manufacturers are trying to gather up July and August business. There is not half the amount of finished iron in stores or at mills that there usually is. The mill men have been acting very conservatively all Spring. They have not been piling up an enormous amount of iron in anticipation of a Summer demand; this restriction of stocks is not helping prices, however; all buyers can be promptly supplied with whatever they want, but it would take a very little run to bring about an exhaustion of stocks. The mill men are going to keep on this way during the Summer, so it is said.

The Local Situation. The season is progressing apace, but owing to a series of delays, in one way and another, little is known of the results accomplished thus far in the ore business. The output, in 1890, was about nine million tons, of which approximately two millions and a half was left at Lake Erie docks at the beginning of this year's business. Since then the reports have been of the most conflicting character, so that without the individual aid of the ore men all that can be said of the business up to date must remain the merest guess, both as to the amount of ore actually sold, and as to the quantity to be mined this year, for 1891 delivery. Some of the producers say that they mean to get out quite as much this year as last, and that they have disposed of about three-quarters of this output; others contemplate the mining of only half as much as they did last year, and report sales of one-half only of this reduced quantity; and still others prefer to do little at this time, waiting a turn in the market, and are holding off for better prices, when they will determine which policy to pursue. Even among well-posted men in the business there is the greatest possible diversity of opinion with regard to the expected output for the year, some inclining to five million tons, while others exceed that estimate by two million. It may be said, however, that in view of the complications which have embarrassed the market up to date, it will require a season of the greatest and most successful activity during the remainder of the year to bring down five million tons of ore. Moreover, if the lake shipping could handle a larger quantity of ore, there would be no room on the docks, hereabouts, to take care of it, for it must be remembered there is the two million and a half left over from last year to be disposed of as well. At any rate, dealers say that they notice quite a stiffening in the price of ores, and lake freights have gone up five cents during the week, making the Escanaba rate sixty cents, and the freights from the head of the lakes eighty-five cents. In former years the proportion of vessels under charter was about ninety per cent., as against a wild tonnage of ten per cent., but this season the conditions appear to be largely reversed, for by far the greater portion of the shipping is going wild. This means that the ore yet to be sold is subject to the increase in vessel freight yet to come, and will cut quite a figure in the market. The dock strike, which came to an end this week, will, for the next three weeks, seriously interfere with the speedy handling of ore, as the vessels, both light and loaded, are bunched, and are apt to remain so for some time, until the tangle may be straightened out. In the pig iron market signs of improvement are not wanting, and although the price for spot iron is not any higher, it is firm, and the furnaces are no longer anxious to cover their output. The demand is fair in all the lines, but is best for Bessemer. There is no Bessemer to be had for June or July delivery, and but very little for August remains uncovered. The price of Bessemer and No. 1 foundry irons is about $15.50 cash, at the valley furnaces, with a dollar less for No. 2 foundry, but mill iron is exceptionally strong, and is being held for $13.75. The mills are rushing as much work through as possible in anticipation of their shut-down, to begin July 1, and the hardware trade reports a good business.

SIDE LIGHTS ON THE SHIP CANAL SCHEME.

Mr. J. M. Goodwin, Chief Engineer of the Pennsylvania Ship Canal Commission, contributes an interesting letter to *The Iron Trade Review*, this week, in defense of the commissioner's report against the charge that it does not take into account the great changes that have taken place in lake tonnage of recent years. Mr. Goodwin's argument will have to stand on its own merits, but it is not out of order to say that he proves himself an adept at handling statistics, and our amiable contemporary, the *Marine Review*, will have to ram its guns to the muzzle with grape and shrapnel if it expects to meet Mr. Goodwin with his chosen weapons on equal terms. In the meantime, *The Iron Trade Review* will continue to act as an interested spectator to the polemic combat, only giving such encouragement to either side as the exigencies of the case may seem to require, always keeping in view the fact that it is the province of a representative paper to give the *news*, without fear, favor, or prejudiced comment.

Since the accuracy of the commission's report has been impugned in some quarters, it may be interesting to compare the respective statements of the lake marine (December 31, 1889)—exclusive of Lake Champlain—as made by the Census office May, 1891, and the Ship Canal Report, made February, 1891. Here they are:

CENSUS BULLETIN NO. 66.

Paddle steamers	54
Screws, including tugs, ferry boats, and pile drivers	1,259
Sand boats, dredgers, and fire boats	12
Steam lighters	4
"Unclassified"	52
Yachts	52
Total steam	1,428
Sailing vessels—	
Schooners, barges, scows, yachts, and one "yawl"	1,217
Sloops, and sloop yachts	42
Total sailing	1,259
Aggregate vessels	2,687

SHIP CANAL REPORT.

Paddle steamers	61
Screws, all classes, tugs, etc., except as below	1,273
Steam lighters	2
Steam canal boats	55
Yachts	44
Total steam	1,435
Sailing vessels—	
Schooners, schooner yachts, barks (3) and 1 "rigged barge"	1,215
Sloops and sloop yachts	32
Total sailing	1,247
Aggregate vessels	2,682

Considering the difficulty of obtaining semi-official data, the commissioners appear to have come reasonably near the facts.

"WILL BRITAIN RETURN TO PROTECTION?"

Such is the startling query propounded by the *British Manufacturer* in its issue of June 1, and its answer is most significant, considering the source from which it comes and the constituency to which it is addressed. Characterizing the Premier of Great Britain as one who "sees and understands that universal Free Trade is much further off in the dim and distant future than what Mr. Cobden thought it was," and yet a person who shows "a dogged determination not to yield to the inevitable," the *Manufacturer* goes on to make this stinging arraignment of Free Trade:

Transpiring events are object lessons that bear directly on the question. Lord Salisbury may be viewed as the standard bearer of Free Trade; and we may inquire what advances that theory has made outside of Great Britain since it was inaugurated 50 years ago. The answer is, that while Great Britain has clung to it with great tenacity and perseverance, there is now no other important nation that entertains it. It has been abandoned for protection; and we see that under the benefits of protection France and Germany are sharing largely in a trade that was once under the entire control of Britain, even invading the British home market and creating havoc and consternation among British manufacturers, and the utmost distress among British workmen. Lord Salisbury has no power, under Free Trade, to relieve this terrible state of affairs. On the other hand, Mr. Blaine, backed by the power of American protection, is forcing other nations to make terms with him by which they will receive American products on better terms than Lord Salisbury can hope to obtain for his country.

The *Manufacturer* proceeds to show how Mr. Blaine has "forced" Brazil, Spain and other countries to enter into reciprocal arrangements with the United States, to the manifest advantage of both parties, and says that "Lord Salisbury could never have forced such an arrangement in favor of Free Trade Britain; and Mr. Blaine could not have forced such arrangement if the United States had not entertained a high tariff policy." It further demonstrates by the British Board of Trade statistics that while imports into that country are increasing, exports show a clear decrease. Commenting on the fact that imports of manufactures of cotton into Nottingham and of woolen into Yorkshire have increased by over 10 per cent., it says: "This is Protection bearding the British Free Trade lion in his den; and these importations into Britain of cotton and woolen fabrics are from the most highly protected countries—France, Germany and the United States."

Even that monument of conservative English sentiment, the London *Times*, after reviewing the situation, makes use of this remarkable language: "Other nations will not give us something for nothing, nor is it reasonable to expect it. Wisely or foolishly we elected to denude ourselves of the power of offering them a fiscal *quid pro quo*, and to trust entirely to the force of example and the inherent power of our Free Trade principles. Having nothing to offer in return for favors, it is idle to beg other nations to refrain from what they think profitable, merely because it is disagreeable to our manufacturers," which, we apprehend, sizes up the situation as neatly as the most ardent Protectionist might desire. The *Manufacturer's* question may mean more than appears on the surface.

CHEAPER IRON IN THE TWO VALLEYS.

Practically all the furnace capacity of the Mahoning and Shenango Valleys is now in blast, the majority of stacks having blown in during the first week in June. That means a weekly production of from 20,000 to 25,000 tons now, as against six months of voluntary idleness. Moreover, it means a reduction in the cost of manufacture which a correspondent of the Baltimore *Manufacturers' Record* figures out at $2 per ton. This is the way he does it:

The reduction in the prices of Lake Superior ores amounting to an average of about $1 per ton, 25 cents off on a ton of coke, and a 10 per cent. reduction in furnace labor, equal to about 15 cents per ton of iron, make a total of about $2 per ton of pig iron produced as the advantage that has accrued to ironmakers in the Mahoning and Shenango Valleys, and in the Pittsburgh and Wheeling districts during the last six months. It is in consideration of such an advantage as this that the general resumption of operations in this region is taking place. Manufacturers hereabouts express considerable confidence in the future of the iron trade, and do not look for any conditions that would necessitate a reduction from the present selling prices. With coke at $1.90 there is still ample opportunity for a reduction from that figure, and furnace operators freely express their belief that coke will be cheaper before long, now that the Connellsville strike is over and more than three-fourths of the ovens in that region lighted. The manufacturers have not abandoned the idea of cheaper transportation, and, indeed, there is plenty of room for such a reduction without danger of any injustice to the railroads.

The *Record*, commenting editorially upon the above statements, sounds a note of warning to Southern iron-makers in these words:

Briefly, the situation is this: The iron manufacturers of the two valleys have been idle for six months; they have disposed of their accumulated stocks of pig iron, and they are now resuming operations under conditions that enable them to make iron about $2 per ton less than they could when they blew out their furnaces in January last. Now, if the Southern manufacturers expect to sell their iron in competition with the valley manufacturers, as they have been doing for months past, they must be prepared to meet much lower prices than their Northern competitors have hitherto been able to make. Are the Southern manufacturers prepared for this? Have they been able to reduce the cost of their iron to an extent that will compare with the reduction in the North? Are they able to reduce the price of their pig iron $2 per ton if such a course be necessary in order to hold their trade? Two dollars is a very large sum to be lopped from the price of a ton of pig iron, and it represents about double the profit that most manufacturers have been making during six months past.

Added to the lessened cost is the remarkable financial soundness which enables the furnace companies of the two valleys to shut down for six months, seemingly without embarrassment. In calling attention to this fact does the *Record* suggest still further comparisons?

REFERRING to some recent comments of *The Iron Trade Review* on the growth of Protection sentiment in Great Britain, the *National Labor Tribune* (Pittsburgh) says:

The *Labor Tribune's* view of it is that what's good for one man may be poison for another. The conditions in Great Britain are so radically different from those prevalent in America that their trade policies must differ in like degree. America has an exceptionally rich home market and it wants to build up industries. Great Britain's home market is worth looking after, but the foreign markets are a necessity to the industries of that kingdom, and its industries are in a finished shape. Protection against America would be simply adding to the price the British people would have to pay for eatables, those requisites of John Bull's stomach, beef, pork and wheat; and would also add to the price of the cotton goods they consume. It is only a country having like conditions to those of America that the American policy can apply to successfully.

The opinions of the *British Manufacturer* and the London *Times*, quoted elsewhere, scarcely carry out the *Tribune's* view of the situation.

IRON pipe is being shipped from Philadelphia by the all-water route to Seattle, a distance of 13,000 miles, in direct competition with Western iron towns and foreign dealers. Nearly all the water-pipe in San Francisco, San Diego and Portland also went by this route.

If this can be done by the distant Patagonian route, at how low a figure can Eastern pipe be laid down on the Pacific coast when the Nicaragua Canal is completed?

THE Chattanooga *Tradesman* is again overwhelmed with the beauties of the storage warrant system and gives a half column of its valuable space to an article on this subject. It is scarcely necessary to say that it fails to quote from the numerous articles now appearing in the leading iron journals of Great Britain condemnatory of this system.

OUR exports of manufactures of iron and steel in 1890 amounted in value to $29,100,660. Of agricultural implements alone we exported $3,859,184 worth, of which $1,097,526 worth went to the Argentine Republic. Our foreign trade is slowly but surely increasing.

RESTRICTION AGAINST ENTERPRISE.

The current issue of the Cleveland *Iron Trade Review*, in its "general features" of the market, says:

"A rather significant 'straw' in the trade wind is the fact that car companies are at last begining to purchase more freely. They state that in making bids for furnishing cars to-day they are asking more than was named 30 days since, and sales are being effected, though no large transactions have been reported. The feeling is that the coming 30 days will show increased demand for cars at higher prices than have been ruling, and that the long-continued policy of not buying or repairing cars on the part of railroads will change to increased activity, owing to the heavy demand to move the crops, and that all car companies will have until fall what business they can turn out. To offset this is the prevalent feeling among consumers of pig iron that the end of the coke strike means a large addition to output, and that this will prevent an advance, if not cause actually lower prices. This keeps back the large buying movement that might naturally be expected to follow a long period of light purchases. Whether this is a wise course to pursue remains to be seen."

If the fear expressed in the foregoing has real foundation in fact, mayhap the following may have the effect to give courage to bashful consumers:

"SCOTTDALE, PA., June 15.—The coke operators will blow out ovens on account of the increased demand which has occurred in the market during the last week. The Frick Co. to-day blew out 22 per cent. of their ovens at the Mutual, Calumet and Redstone works. These works have been running full since the collapse of the strike."

It is a debatable question whether sudden and wholesale shut-down of production has the effect to revive a market. The coke and blast furnace shut-down certainly did not have the effect intended on the iron market. Though prolonged to equal about 20 per cent. of the producing year, the restriction was counterbalanced by the caution of consumers, who naturally inferred that the market was demoralized, and that it might become much more so, thereby giving them promise of still lower prices. Many furnaces went out of the market, and so did many consumers of iron, so it is a question whether anything was gained to the producing interests by the restriction of output. Had business gone on as usual, lack of confidence would not have been created as it was, and the present condition and prospects would be at least as fair as they are now. The buying movement would not have stopped short; it might have been less for a time, but the prices would have been encouraging to extensive enterprise, and that would mean general activity all around the business circle.—[National Labor Tribune.

Denmark and Foreign Iron.

The Committee of the Wholesale Dealers' Union, in Copenhagen, has just published its commercial report for 1890, dealing generally with the trade and means of communication of Denmark. In referring to iron and steel, the report contains some pertinent remarks. It states that "In recent years the import trade of iron bars and plates for forge and engineering works has gradually gone over to German firms, whereas formerly the greater portion was supplied by Sweden. The considerable imports of Swedish plates have diminished to a very small amount since the Rhenish articles (Siegen) were introduced. Swedish iron possesses great softness, purity and proportionately large ductility; it is used for horse-shoe manufacture and fine work where the iron undergoes considerable bending. On the other hand, German iron has a fine face, is regularly rolled, and of fine grain; and it is applicable to general engineering and constructive work, bolts and nuts, screws, etc. Belgian and English iron is, however, only used where small sorts, such as iron beams, cast iron pipes, cisterns and reservoirs, are required. The German iron industry is remarkable for its capacity of constant progress. Whilst the provision of Belgian and English iron during the past year was smaller than usual, that of German iron advanced, the latter being substituted for the Swedish iron formerly used. The endeavor of the German work is to produce a purer and better article."—[Colliery Guardian, London.

Canada's Iron Industries.

The production of pig iron in Canada last year amounted to only 21,772 tons, valued at $331,000. Reducing all the iron and steel used to the basis of pig, the country consumes about 400,000 tons of pig iron a year. All told, the value of the mineral products of the Dominion, in 1890, was $19,000,000. The production of iron ore was 76,500 tons. Iron is found in considerable quantities in all the Provinces, and the supply is practically inexhaustible. The iron of Nova Scotia is particularly fine, and brings in the market nearly double the price of English iron.

LAKE COMMERCE AND THE PROPOSED SHIP CANAL.

BY J. M. GOODWIN.

WRITTEN FOR THE IRON TRADE REVIEW.

Following its statements that the entire report of the Canal Commission (relative to applicability of lake craft to canal service) is based on a consideration of the "inferior" vessels of the lakes, only; and that these inferior vessels, (the "little" craft, that could get through locks 300′x44′ in the clear, with 15 feet of water on the sills,) are "fast becoming removed from the lake marine," the *Marine Review* asserts that "the lakes own more steam vessels of 1,500 to 2,500 tons than the combined ownership of this class of vessels in all other parts of the country. This class of fast steam tonnage is used in the ore and coal trade of the lakes. Canal vessels cannot compete for the business." Why draw the line at 2,500 tons? There were in service on the lakes, in 1889, several screw steamers of over 2,600 tons, "gross" tonnage. There were three of 2,669 "gross" tons, each. We will count in everything over 1,500 gross tons measurement, including five paddle-steamers that are not ore-carriers.

The list for 1889, given in the Canal Commission report, shows 143 "steamers" of 1,500 tons and upward, on the lakes (exclusive of Lake Champlain) but this list did not include three passenger steamers which may properly be rated in this class. Including these three vessels there were on the Northwestern lakes, in 1889, 146 steam-vessels of 1,500 gross tons, and upward.

	Tons.
Three of these were "composite" vessels, aggregating	6,401
Twenty-one, (including three paddles) were of steel	45,642
Twenty, (including two paddles) were of iron, aggregating	37,807
So aggregate tonnage in steel, iron and comp. was	89,850
Aggregate tonnage in wood (averaging 1,843.54 tons) was	188,041
Grand aggregate of steamers over 1,500 tons	277,891

Of steamers of 1,500 gross tons, and upward, owned at tidewater ports of the United States (exclusive of Mississippi river steamers, and not including any of the great ocean "liners,") there were in 1889, 148.

	Tons.
Of these, three were steel, aggregating	6,084
And 108 were of iron, aggregating	281,557
Aggregate tonnage, iron and steel	287,641
Thirty-seven were of wood, (averaging 1,745.56 tons) aggregating	64,586
Grand aggregate of tidewater steamers over 1,500 tons	352,227
The average tonnage of the above specified steel steamers of the lakes is	2,173.42
Average tonnage of steel steamers at tidewater ports	2,028 00
Average tonnage of iron, steel and composite steamers of the lakes, (1889), was	2,042.04

Of the 148 steam vessels, over 1,500 tons, owned at tidewater ports, in 1889, 111, or 75 per cent. of the number, were of metal.

Of the lake equipment of same class 30.1 per cent. (including the composite vessels) were of metal.

In 1889, there were owned at the port of New York, 68 steamers of 1,500 tons and upward, having aggregate gross tonnage of 164,934 tons.

Of this fleet 59 vessels were of metal, having aggregate gross tonnage of 147,288 tons, or 57,438 tons in excess of the entire metal tonnage of the lakes.

As seen above, the aggregate tidewater tonnage (over 1,500 tons), or 74,336 tons in excess of lake tonnage of like class.

As to the assertion that the biggest and fastest steamers of the lakes are the ore and coal carriers of the lakes to the exclusion of vessels of other classes, we have to repeat, what the report of the Canal Commission fully sets forth, that more than 25 per cent. of the ore delivered at Lake Erie ports for supply of the Allegheny-Mahoning-Shenango district comes in sailing vessels; and that of the entire fleet of ore and coal-carriers on the lakes in 1889 (the year with which the report of the Commission deals), more than 50 per cent. were applicable to service in a canal such as that recommended by the Commission.

In making its investigations the Commission particularly analyzed the business of the L. S. & M. S. R'y Co.'s docks, at Ashtabula harbor, for the reason that the receipts of ore at those docks are materially greater than those of any other one system of docks on the lakes.

Of the 1,039,920 gross tons of ore received at said docks, in 1889, 25.1 per cent. came in sailing vessels; and of the sailing vessels bringing it 94.2 per cent. were of less than 1,000 tons, gross measurement. Fifty-three and seven-tenths per cent were between 600 and 900 tons and 33 per cent. were below 600 tons measurement.

Twenty-four and one-half per cent. of all the sailing vessels delivering ore at said docks, in 1889, have been built since January 1, 1880, and 12.26 per cent. since January 1, 1885.

Of the steam vessels bringing ore to said docks in 1889, 55½ per cent. were under 1,500 tons gross measurement; and 73¼ per cent. were under 1,800 tons.

Of the steam fleet delivering ore, as aforesaid, over 92 per cent. have been built since 1872; and of those built since 1872, 52 per cent. are of less than 1,500 tons gross.

Of those of less than 1 500 tons, 17 have been built within the three years ending June 30, 1889; and 23 have been built since June 30, 1886. Of these 23, 12 are of less than 1,000 tons, each.

The average ore-cargo delivered at said docks at Ashtabula, in 1889, by steam and sail together, was under 1,500 gross tons; total number of cargoes, 696.

The average total delivery of ore at said docks, in 1889, per vessel, steam and sail taken together, was 3,924.226 gross tons. Average total delivery of ore by the steamers (total number of steamers into total number of tons delivered), was 4 960 tons.

Of the schooners delivering ore as aforesaid, one group of 25 delivered average total of 5,298 84 tons; and one group of 10 delivered average total of 6,940.1 tons.

Of two schooners, built in 1874, of 863 and 845 gross tons respectively, one delivered 8,939, and the other 8,901 gross tons.

Of the coal shipped (in 1889) from L. S. & M. S. Railway docks at Ashtabula, 35.1 per cent. went in sailing vessels. The average of all cargoes of coal,

so shipped, was 1,077.1 gross tons. Of 104 cargoes, shipped in 104 several vessels, 73 per cent. were of less than 1,250 gross tons. Of 139 vessels taking coal cargoes, 62½ per cent. were of less than 1,430 gross tons coal capacity.

These facts refute the assertion that the "big, fast steamers" do the ore and coal-carrying of the lakes to the exclusion of vessels that are neither very big nor very fast.

The statement of the *Marine Review* that the schooners are fast disappearing from the lakes is not in accord with the facts. The schooners are so far from disappearing that those of 400 tons and upward have increased in number at a rate exceeding that of the increase of the lake marine as a whole.

There has been a decrease since 1872 in total number of sailing vessels on the Northwestern lakes; but this decrease has been entirely in vessels below 400 tons measurement.

Total vessels (all classes) on lakes (exclusive of Champlain) in 1872 was 2,090; in 1889 it was 2,682. Ratio of increase: 1 2832. Ratio of increase of sailing vessels between 400 and 1,500 tons: 2 026. Ratio of increase of steam vessels (all classes) 2 148.

RATIO OF INCREASE OF STEAMERS. 1872-1889.

Between	500	and	600 tons	2.1666
"	1,000	"	1,100 tons	2.3333
"	1,100	"	1,200 tons	2.4545
"	1,200	"	1,300 tons	4 000
"	1,400	"	1,500 tons	2.750

RATIO OF INCREASE OF SAIL VESSELS 1872-1889.

Between	600	and	700 tons	2.000
"	700	"	800 tons	2.9090
"	800	"	900 tons	3.1666
"	900	"	1,000 tons	14.000
"	1,000	"	1,100 tons	5 000]

Decrease in sailing vessels under 200 tons, 173; between 200 and 400 tons, 120; aggregate decrease, 293. Increase in vessels above 400 tons, 120. Ultimate decrease 173.

	No.	Tonnage.
Total sailing vessels, in 1889, of 300 and up to 400 tons	162	54,166
400 tons and upward	238	161 238
Aggregate	400	215,404

Of these 400, twenty are over 1,000 tons, aggregating 25 437 tons; average about 1,272 tons.

Exclusive of the vessels of over 1,000 tons we have 189,967 tons of sailing craft exactly suited to canal work. This fleet has carrying capacity of 247,241 gross tons of ore, and in 12 round trips would carry down the canal 3,000,000 tons of ore, and bring back 2,700,000 tons of coal. This is the sailing fleet only.

"Canal" steamers, of 500 to 600, and from 700 to 1,200 tons are not "disappearing." The ratio of increase in these classes is much greater than that of increase of steamers altogether. In 1889 there were on the lakes of screw steamers between 400 and 1,400 tons, 221. In addition to our fleet of 380 "canal" schooners we have a fleet of at least 200 steamers suited to canal work.

Were the completion of the canal within a given time an assured event, vessels would be built, in anticipation of the opening of the waterway, to carry fully 3,000 gross tons on 14 ft. draft.

Even now (June, 1891,) we have the new steamer "E. C. Pope" bringing 2,741 gross tons of ore, from Lake Superior, on 14 ft. 1 inch draft. To be sure, the "Pope" is 337′x42′, and would not pass locks of the size recommended for the Ship Canal; but a steamer 300′x44′ would pass such locks and would carry 3,000 gross tons on 14 ft. of water, exclusive of canal fuel.

But the current practice in building of lake-freight-carriers will supply all the "canal"-craft necessary to a full utilization of the canal.

Of the one hundred and eleven (111) screw steamers built in 1889 seventy-one (71) per cent. were below 1 400 tons, gross. Of the 50 above 300 tons measurement 36 per cent. are distinctly suited to canal service; and 42 per cent. are entirely available for such service.

Of schooners built in 1889 there were eleven between 300 and 1,200 tons, gross.

In 1888 there were built, on the lakes, 25 steamers, (exclusive of paddles,) of from 400 @ 1,500 gross tons, and three between 299 and 400 T.; and seven schooners of over 300 tons.

Thus in the two years (1888 and 1889) we find built, on the lakes, 60 "canal" vessels; viz.:—39 screw steamers and 21 sailing vessels.

A New Feature.

Commencing Sunday, June 21st, the Pennsylvania Lines will inaugurate a daily through Pullman sleeping car service between Cleveland and New York, leaving Cleveland 1:40 P. M, and arriving at Pittsburgh 5:55 P. M, Philadelphia 5:25 and New York 8:00 o'clock next morning. Cleveland passengers will be served with supper in new Pullman dining car on the Fort Wayne route between Alliance and Pittsburgh. A corresponding fast train will be run west bound, leaving New York at 6:30 P. M. daily, arriving at Cleveland 11:40 A. M. next morning, with through Pullman sleeper. Breakfast served in dining car. Pullman's newest and best sleeping cars, with drawing room and smoking room, will be run in this service. Note the quick time and through car service to Pittsburgh, Philadelphia and New York every day in the week, and reserve your space at city office, Weddell House corner; telephone 1263; or address C. L. Kimball, Ass't. General Passenger Agent, 155 St. Clair Street, Cleveland, O.

THE July *Lippincott's* opens with a charming novel by Mrs. Amelia E. Barr, called "A Rose of a Hundred Leaves;" other articles are: "Physical Culture," by Edwin Checkley; "A Surpise to Mr. Thompson Byers," by Richard Malcom Johnston; "The Future of Cuba," by Frank A Burr; "Triumph," by Helen Gray Cone; "English and American Newspapers," by Alfred Balch; "The Vengeance of Padre Arroyo," by Gertrude Franklin Atherton; "Talleyrand and Posterity," by C. R. Corson; "Captain Charles King and his Army Stories," by Major William H. Powell.

From End to End.

The entire length of the line, tickets will be sold at one fare for the round trip, July 2d, 3d and 4th, between any two stations on the Nickel Plate.

RECALESCENCE IN STEEL AND IRON.

In the current number of the *Philosophical Magazine*, Mr. F. J. Smith gives an account of some new methods of investigating the points of recalescence in steel and iron. The object of the experiments was to discover the time connection which exists between the change of form and the change of temperature. Several methods of experimentations were tried, and the following was the one finally adopted. The upper end of the steel wire to be tested was fixed vertically; the lower end was attached to a long light lever of aluminum, so arranged that a small change of length of the wire caused a large movement of the end of the lever, which traced a line on the smoked surface of paper rotating on an ordinary physiological chronograph cylinder. A platinum-platino-rhodium therma-couple, twisted round the wire where it was heated, was in circuit with a Deprez D'Arsonval galvanometer. By means of this combination the temperatures at which the changes of length of the wire took place was read. The movements of the beam of light reflected from the galvanometer were recorded on a moving photographic film. The outcome of the experiments was that the changes of form of the metal under examination took place at the times of change of temperature, so that a curve so traced on a smoked paper can be used as an index of the changes of form and the changes of temperature. Thinking that it might be probable that these changes might be accompanied by some sounds at the critical points, the following apparatus was constructed: A mica disk was fitted into a circular recess turned out of a piece of wood. The steel wire under examination was attached at one end to the center of the disk, at the other to a vertical post. The front of the recess into which the mica disk was fitted was furnished with two sounding tubes. On heating the wire a certain temperature was reached at which a sharp crackling sound was heard. As the temperature was increased this ceased; then, on removing the flame, at the same temperature at which the first sound was heard, a second similar sound occurred. This took place at the point of recalescence. As the wire cooled this ceased, and then when a temperature of about 490° C was reached, a very sharp sound was emitted. This third sound appears to take place at the second critical point observed by M. Osborn. The wire used in these experiments was steel pianoforte wire, annealed and straightened. The last experiment was also arranged so that the steel wire when heated should be in a strong magnetic field. Repeated trials showed that the sounds produced were in no way altered by the fact of the wire being in the magnetic field.

Southern Pig Profit

The Pulaski Iron Company's annual report for the year ending March 31 has just been issued. The company owns the Pulaski furnace, the plant, with houses, etc., being valued at $324 424 07, while the mineral properties aggregate 2,369 acres, which represent, including 200 shares of the Virginia Mining Company at cost, $150 740 94. During the year the furnace was out of blast for repairs 68 days, and other stoppages carried the total to 103 days. During the time that it was in actual operation, 262 days, the furnace made 30,401 tons, equivalent to 116 4 tons per day, at an average cost of $12 01. The total ore consumption of the furnace was 71,168 tons, the average yield of which was 42 71 per cent. During the first six months of the fiscal year the average net price received at the furnace for pig iron sold was $13 08, while during the last six months the net price was $12 72, the average for the year being $12.88. There was paid a 10 per cent. dividend on $300,000 capital on May 15, 1891, and in August and November of 1890, and February, 1891, a dividend of 2½ per cent. for each quarter on $450 000 capital.

Second-Hand Rails May be Reimported Free

The Treasury department has rendered an important decision concerning the importation of railroad iron. An application has been made by the President of the Michigan Central Railroad to reimport free of duty quantities of steel rails exported by the Michigan Central Co. from the United States for the use on its Canadian Southern road in Canada during the last ten years. The application states that these rails are partially worn, and it is desired to reimport them for use on branch lines in Michigan or for sidings. The department decides that if the identity of the rails is proved they may be reimported free of duty.—[Railway Review.

Scribner's Magazine for July (beginning the tenth volume) has its leading article on a subject which attracts particular attention at this season—"Speed in Ocean Steamers." The author, A. E. Seaton, is connected with a large shipbuilding firm in England, and makes perfectly plain to untechnical readers the various conditions which must be borne in mind in designing ocean greyhounds, and the most advanced methods which have met them. The illustrations show a number of the fastest steamers afloat. This issue contains also two illustrated out-of-door articles—one on "Izard Hunting in the Spanish Pyrenees," and the other fishing for the Black Sea-bass on the Pacific Coast. The number is unusually rich in fiction, containing four complete short stories. There are three articles of political importance—one on "Starting a Parliament in Japan," by Professor John H. Wigmore, of the University of Tokio; another giving a civil engineer's glimpse of the revolutionary Republic of Hayti, and the third summarizing the romantic history of outlawry on the Mexican border. A picturesque account of an old Danish town; a literary essay of unusual quality on Landor, and poems by John Hay and Mrs. James T. Fields, complete a number of remarkably varied interest. The frontispiece is the last one of Mr. J. R. Weguelin's notable full-page illustrations for selected Odes of Horace.

ABOUT 1,000 architectural iron workers have gone on a strike at Chicago. They demand eight hours as a day's work at 30 cents an hour. Several firms seem inclined to yield, or at least to make some concessions. The strikers are very firm in their demands, and well organized.

LAKE SUPERIOR MINING NOTES.

The Norrie outdid all former shipping records on Thursday, when a total of 8,600 tons were sent out. The boys claim they will load 9,000 tons some fine day when everything works just right.—[Iron Tribune.

Mining operations have been resumed by the Platt Iron Company, on its property adjoining the Wheat on the Cascade range. Charles L. Lawton, son of ex-Commissioner C. D. Lawton and formerly time-keeper of the Florence, is in charge as local agent and rather inclines to the belief that the Platt will ultimately have a place among the dividend paying mines of the county.—[Negaunee Herald.

It is estimated that fully 350,000 tons of ore will be shipped from the Crystal Falls district this season.

The Mastodon expects to ship about 60,000 tons of ore this season.

The Sheridan, Iron River district, has not suspended operations entirely, as seems to be the general impression. No active mining is going on, but some work is carried on.

All of the mines in the Crystal Falls district, with the exception of six, present scenes of general activity, and if the visitor did not know it was a season of depression in the iron ore markets he would never guess it after reviewing operations in the great iron district of Crystal Falls. At the present writing the shipping mines are: Mastodon, Shafer, Paint River, Monitor, Dunn, Hemlock, Mansfield, Great Western. The mines that shipped last year and are now idle are: Youngstown, Armenia, Crystal Falls, Manganate, Hollister, South Mastodon. The last season shipment of the mines now working aggregated 458,478 tons, while the now idle properties was but 79,291 tons, making a total of 537,769 tons. It is hardly probable that the Mastodon mine will reach its output of last year; but 30,000 tons have been disposed of so far this year, though there is plenty of time to sell, and the mine could yet make a record even if not ahead of that last year. The Dunn will quite likely even its '90 output of 156,000 tons. It is in condition to do even better than that if a demand is made. The Shafer has contracted to deliver ore this year to nearly double the output of last. New opening of ground and late additions of heavy machinery bespeak that all of the ore contracted will be removed, and more too. The Paint River is driving on with heavy strides and will undoubtedly hold even; it is better equipped than last year. The Monitor has disposed of more ore than was shipped last year, but to what extent the contracts reach the writer is unable to state. New hoisting machinery and plenty of ore is a seeming guarantee of a great Summer for the Monitor. The Hemlock was not connected to the world by rail last year, but it is this, and began to send out ore as soon as the track would permit. A considerable lot of this excellent ore has been sold, but the season's output cannot be estimated to any degree of certainty. One thing is certain, the Hemlock will answer all demand, the fact that its office work is done in a tent, made necessary by the recent disastrous fire, does not stand in the way of mining and shipping ore. The Great Western put out 71,713 tons of ore last year and is good for 100,000 or more this season, under its able local management; daily shipments are being made but the extent of sales is not yet made public. The Mansfield, the only all Bessemer producer in the district, did not get in in time last year to make much of a showing. It is understood, not officially, though, that the output of the season has been sold and means possibly more than 75,000 tons. Taken all in all, the outlook of the district for this year is not bad, and the total shpiment, which seems to point in that direction now, will even or exceed that of '90, without the aid of the mines now idle.—[Diamond Drill.

Lake Superior Shipments of Iron Ore:—

Lake shipments of iron ore from the mines of Lake Superior, for the season of 1891, up to Wednesday, June 17, are as shown by the appended statement:

MARQUETTE RANGE.					
Champion	2,062	Lake Superior			3,983
Total Marquette Range					6,045
MENOMINEE RANGE.					
Florence	11,757	Ludington			28,645
Total Menominee Range					40,402
GOGEBIC RANGE.					
Ashland	6,841	Father Hennepin	4,521	Palms	2,120
Aurora	12,981	Germania	1,768	Pabst	28,779
Colby-Tilden	2,215	Montreal South	3,193	Sunday Lake	4,545
East Norrie	22,722	Mt. Hope	6,440	West Cary	13,627
Eureka	2,015	Norrie	44,856		
Total Gogebic Range					156,628
VERMILION RANGE.					
Chandler	41,141	Minnesota			63,609
Total Vermilion Range					104,750
Grand totals					307,825

The Ship of the Future.

It is common experience with shipowners and shipbuilders to have propounded to them means whereby even 30 knots per hour may be realized, and these backed up by very elaborate calculations as proof, but which, when investigated, are found, like those of a well-known writer of scientific romance, to be wanting in some little detail, insignificant at first sight, but absolutely essential to complete the proof. So far no great departure from the existing form of ship, nor from the method of propulsion, has resulted in obtaining a higher speed than is common with ordinary ships of the same dimensions; and in nearly every case such departures have mortified the inventors as well as disappointed the public by turning out absolute failures; and there is no good reason to suppose that further successes than have already been attained will be achieved in any other way than by improving the conditions that now obtain, both as regards form of ship and method of propulsion, inasmuch as the physical causes which combine as retard the motion of a vessel, and the physical forces which are employed in overcoming that resistance, remain to day as they ever were, and are—in fact, Nature's immutable laws. The commercial question is also one that presses very hardly at all times and must continue to do so more and more, as will be seen later on. The Atlantic greyhound of to-day is, in immersed form, substantially that of the viking's craft of more than a thousand years ago. And if we look to Nature for our study we shall find that the swiftest fish are not unlike in general form to the submerged part of a ship; and the comparison is more easily accepted when it is remembered that the fish is wholly submerged while the ship is only partially so. The one has to contend with waves and the other surface disturbances, and must perforce keep above the water, while the other is free from such disturbing elements and conditions, and pursues its course in practically smooth water.—[From "Speed in Ocean Steamers," by A. E. Seaton, in July Scribner.

Homestead Armor Plate Mill.

The armor plate mill at Homestead, Pa., which had been for two months undergoing "repairs" to the extent of thorough reconstruction, is now complete, and is what the Homestead men call "a daisy." That it surpasses any other armor plate mill in the world was evident on the trial on Monday morning of this week, though this result might have been reasonably expected, for in such plants as the Homestead the latest machinery built is usually the best in operation. That is the aim of the projectors, and the mill that does not keep up to such standard must gradually get out of the market. It was at 6 o'clock, June 15, that an 11,000 pound ingot was swung from the soaking pit and put through the 4-high train, and everything passed off "as slick as grease." The notable feature was that the rolls take a draft of two inches, which as ½-inch is the ordinary practice must be set down as a triumph of Homestead.

The mill occupies the old quarters of the 32-inch mill, and it was just eight weeks previous to the start up that the work of removing the old machinery began. The new mill is known as a 4-high mill—that is, it has four rolls in the vertical train and four in the horizontal. Both work in unison, though they are driven by separate engines, that driving the vertical rolls being the smaller. The engines are of the reversible type, quick acting and aggregate 3 000 horse-power. The horizontal rolls have 110 inches of rolling surface. The top and bottom rolls are each 32 inches in diameter; the two middle rows measure 24 inches in diameter; while the four vertical rows are of uniform size. The two housens of the horizontol rolls weigh 45 tons each. Only the two middle rolls are driven, being coupled in the usual way to the driving pinions with a spindle. Of the four rows only the top and the upper middle rolls move up and down the housens—the lower middle and bottom rolls being the receiver. The draft is regulated by the two upper rolls moving up and down the housens at the will of the roller.—[National Labor Tribune.

The Mineral Production of Great Britain.

The value of the mineral products of Great Britain in 1890, amounted to about $463,000,000—an increase of nearly $100,000,000 over that of 1889. This increase in value was chiefly in coal, of which 181,614,268 gross tons, valued at £74,953,997, was produced in 1890, as compared with 176,916,724 tons, valued at £56,175,426, in 1889.

Tin ore increased from 13,809 tons to 14,911 tons. Arsenic increased from 4.758 tons in 1889 to 7,276 tons in 1890, and the value also increased largely.

The mineral and metal production of the British colonies and possessions in 1889, amounted to about $118,500,000 in value, so that the mineral and metal production of Great Britain and her possessions amounted in 1890—estimating the production of the colonies for 1890—to about $670,000,000, or, say, about the value of the mineral and metal products of the United States.—[Engineering and Mining Journal.

Belts and Dressings

Belts should be cleaned regularly, and after cleaning, a good belt-dressing should be applied to keep the belt soft and elastic, and cause it to hug the pulley and transmit its greatest power. The use of a good belt-dressing is superior in economy to any other method for correcting a slipping or slightly loose belt. The custom of tightening a belt whenever it slips is not a good one. The belt is liable to be made too tight, which heats the bearings and strains the belt. Great care, however, should be taken in selecting a belt-dressing. Castor oil is an article in very general use, but experts have found that it contains an active acid principle, and is drying in its nature. The use of soap, rosin, tar, etc., cannot too strongly be condemned. They are only temporary stimulants and eventually destroy the belt. A belt-dressing that is guaranteed to prevent slipping, and at the same time keep the leather soft and elastic, is certainly worthy of careful consideration. Such is Dixon's belt-dressing, made and sold by the Jos. Dixon Crucible Co., Jersey City, N. J. There is no trouble in applying it, and all who have used it commend it in the highest terms.

A German Estimate of Iron Consumption.

Dr. Hermann Wedding, one of the foremost authorities on matters relating to iron and steel, states that the total production of finished iron in the world in 1888 was 18,652,000 tons, in the production of which 23,550,000 tons of pig iron were consumed. A comparison of the world's production of pig iron in that year shows that enough metal was made to provide each inhabitant of the globe with 35 pounds.

ONE day, in 1830, when a working jeweler, Joseph Gillott, now the famous steelmaker, accidentally split one of his fine steel tools and being suddenly required to sign a receipt, and not finding his quill pen at hand, he used the split tool as a ready substitute. This happy accident led to the idea of making pens of metal.—[Invention, London,

DICK'S PATENT TOOL HOLDER.

This tool holder is designed for taking the place of a helper and making it easy for a man to grind his tools alone. It forms a rest for the operator, at the same time putting weight on and guiding the tool. It will hold tools square or on any angle required, and can give them any bevel. Tools are not fastened to the holder, and the operator can examine them and place them

back in the same position. It is no trouble to get the same bevel. The tool can be set to move any distance across the face of the stone. It holds all kinds of chisels, plain bits, beveled bits, hatchets, gouges, and tools from 1½ inches to 20 inches long, and from ⅛ of an inch to 8 inches wide. It does not interfere with using stone for other purposes. This tool is being marketed by Messrs. Palmer, Cunningham & Co., Limited, 607 Market street, Philadelphia, Pa., who are the general agents.

"SOO" AND LAKE TRAFFIC.

The officers of the Sault Ste. Marie Canal will soon publish the results of a discussion of the business of 1890. Advanced sheets show the following figures for the last four years (the last column is corrected to $\frac{1}{100}$ of miles :)

	Net Freight Tonnage.	Valuation of Freight.	Average Distance Carried. Miles.	Total Cost of Water Transportation.	Cost per ton Mile. Mills.
1887	5,494,649	$79,031,758	811.4	$10,075,135	2.26
1888	6,411,423	82,156,020	806.9	7,883,077	1.52
1889	7,516,022	83,732,527	790.4	8,634,246	1.45
1890	9,041,213	102,214,949	707.2	9,472,214	1.48

The average distance is 801 5 miles, as compared with an average railroad haul for the four years ending with 1889, on all the railroads of this country, of 110.63 miles, as returned in Poor's Manual.

The value per ton of merchandise for the above years and the percentage of the value required to pay the freight were as given below; but as the distance transported has decreased another column is added, showing the percentage for a uniform transportation of 800 miles:

	Value per ton.	Percentage of Value Paid for Transportation.	Percentage Paid for Equal Transportation.
1887	$14.39	12.75	12.6
1888	12.84	9 59	9.6
1889	11.14	10.31	10.8
1890	10.30	9.26	11.5

As the total expenditures on the lakes under river and harbor bills above Niagara Falls up to the present time has been $28,038,590, the saving at the "Soo" for last year seems to have returned about $1.80 on every dollar expended on the upper lakes. It is noticeable that if this freight charge had been nine mills per ton mile the freight charges for the distance that merchandise was transported would have absorbed over 61 per cent. of its value, instead of about 9¼ per cent. It is not necessary to call attention to the fact that a great part of the tonnage passing through this canal would not have been produced if it had been obliged to pay so large a proportion of its value for transportation.

It follows, as a matter of course, that with such a large and prosperous business the appliances for conducting it should be constantly improving, and we find that during this time the value of the vessels passing through the canal has increased by about 50 per cent., and General Poe, the engineer officer in charge of the canal and the waterways of the lakes, says of these vessels, in urging government to appropriate about three and one-third million dollars for deepening the lake channels to 20 feet: "These have increased in size and seaworthiness until they have a fleet which has not its equal upon any inland waters on the face of the globe. Of large capacity and great power, regardless of wind or weather, the steamers of the prevailing type bear their cargoes to and from ports a thousand miles apart with the regularity and precision of railroad trains, each of them transporting at once more than ten ordinary freight trains." We may give an example of the efficiency of these boats: The steaming distance from Two Harbors on Lake Superior to Ashtabula on Lake Erie is 889 miles, and the round trip, including loading and unloading 2,300 gross tons of ore, is made in six days throughout the season One of these steamers, the "Manola," the first to go into commission, during the 223 days of navigation, ran 50,580 miles and delivered 77,125 tons of cargo. This record seems ahead of that of "Ed Sol," of the Morgan line, which is probably the best, as it is undoubtedly the handsomest, freighter sailing on salt water. The steaming distance from New York to New Orleans is 1,751 miles, and "Ed Sol" made a round trip, discharging and unloading in New Orleans, in 12 days, 12 hours and 40 minutes.

Just now, with the lowest lake freight rates ever known, about two-thirds of the freight from Chicago toward the seaboard is carried by lake, and this state of affairs is likely to continue until iron ore once more moves freely.—[Railroad Gazette.

ENORMOUS IMPORTATIONS OF TINPLATE.

The amount of tinplate now in the United States bonded warehouses in Philadelphia, Pa., amount to 18 720,408 pounds. These figures represent the amount received and stored up to the latter part of last week. Probably enough more has been received by this time to run the figures up to an even 20,000,000 pounds. Every vessel that comes from Europe has a large amount tinplate as part of its cargo, and, during the last six weeks, the bulk of the tinplate has been sent to the bonded warehouses. The amount became so great that it was found necessary to secure additional room, and a Government officer was placed in charge of a free warehouse, which was temporarily made a bonded one to accommodate the importers of tinplate. There have been large receipts at other seaports, but the bulk of the tin has gone direct to Philadelphia. No figures have been sent out from New York or any other large importing point to give any idea of how much tinplate is in store. There have been so many conflicting statements in the newspapers about the new tariff, when it becomes effective, and how this vast amount of tin will have to be handled, that a statement of the facts will be found interesting. The new tariff on tinplate goes into effect July 1st, next. The present duty is one cent per pound, and the new duty will be 2⅕ cents per pound. All the tinplate which is now in the bonded warehouses will have to be removed before July 1st, or the new duty will be charged. In view of this fact, importers are having a withdrawal paper prepared, and in the course of a few days the withdrawal of the tinplate is expected to begin. It will take considerable time to accomplish the task, but, as it is, instead of decreasing, the amount is constantly growing larger, and there is some doubt as to where importers will put it. It is pretty certain that they will not allow it to remain in the bonded warehouses and pay $2.20 for every 100 pounds instead of $1. Very little of the tinplate has been withdrawn from the bonded warehouses during the present month, but it is known that quite a number are preparing their withdrawal entries, so that no time may be lost.

Jobbers of tinplate do not venture any predictions as to what effect these importations of tinplate will have upon the market after the new duty becomes effective. Earlier in the season an advance in the price of both tin and terne plate was confidently expected, and, up to within a month, the increase was looked for by or before July 1st. However, with these immense quantities of tin in the country, it is probable that no advance in prices will be made July 1st. It is too early for American tin to play an important part in the market, but there is one thing certain—that after July 1st, tinplate will become an important commercial factor in this country, and the growth of its production by American manufacturers will be watched with the keenest interest.—[Stoves and Hardware Reporter.

The Ever Present Fuel Question.

There is still considerable trouble and inconvenience connected with the use of natural gas fuel and many mills, after a second attempt at a universal adoption, have been compelled to resort to the use of coal, and the general impression is that all the different iron and steel mills will ultimately have to return to coal. In Brown & Co.'s and Zug & Co.'s mills the puddlers have at times been unable to turn out six heats. In Shoenberger & Co.'s mill last week there was such a scarcity that it required all of a puddler's time to make three heats to a turn.

These are the only remaining mills out the Penn avenue district using gas entirely, and if no better supplies are forthcoming they will have to fall in line with the many returning to the use of coal. At Carnegie's mills, after a short change, the puddlers at Twenty-ninth street returned to all-night work on account of the lack of gas. It is very likely that a return to coal will be made. In this event 17 out of the 42 puddling furnaces will have to be torn down to make room for coal bins. In the Thirty-third street mill about the same condition of things exist and the puddlers don't expect half time during the coming Summer, unless they change to all-night work.

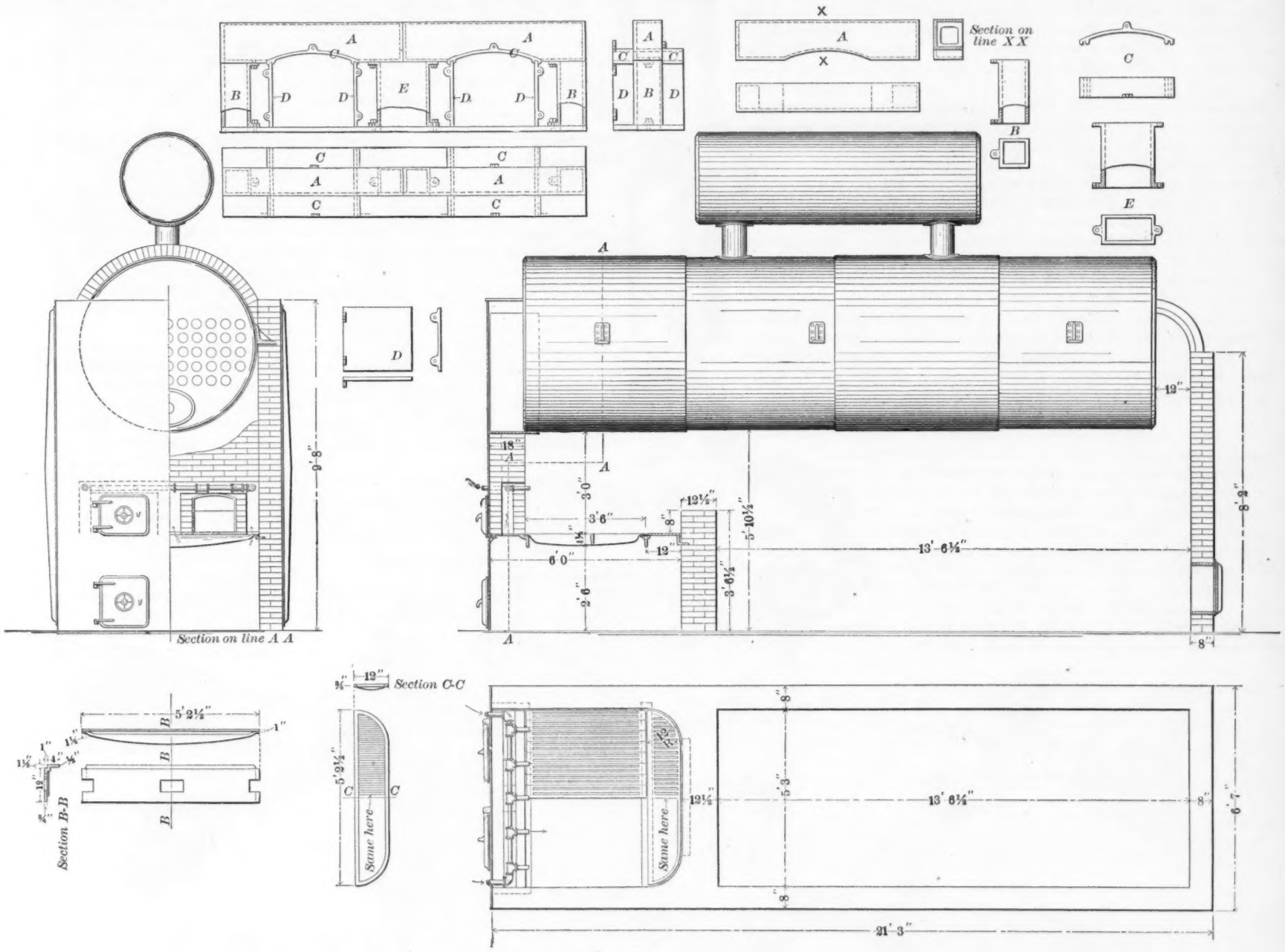
So far two of the 40 furnaces have been changed to coal, with the work of changing the others going on as fast as possible. At these latter mills Manager Berntraeger has about concluded his experiments with his new furnace, and he is quite sure that the inconvenience resulting from a shortage of gas can be easily overcome. In order to carry out the entire success of his intentions all the puddling furnaces in the two mills will be remodeled for the use of coal. The puddlers at the above-named mills will hereafter work from one in the afternoon until seven in the morning, each turn making about four heats, in order to equalize the earnings of the men on both turns, and overcome, as well as possible, the gas shortage.—["E. T. K." in Pittsburgh Dispatch.

Not Only Teachers,

but every one can secure excursion tickets via the Nickel Plate to Lake Chautauqua, from July 2nd to 7th inclusive, at rate of one fare for the round trip. This will afford a splendid opportunity to visit this delightful resort and also attend the meeting of the Ohio State Teachers' Association.

HUTCHINSON'S WATER GAS FURNACE.

The accompanying cut is a drawing of the Hutchinson water gas furnace as applied to stationary boilers. This is claimed to be the only practical method of abating the smoke nuisance on all construction of furnaces. The system is just as applicable to locomotive or tug boilers as to stationary or returned flue boilers. The principal consists in converting steam boiler furnace into water gas furnace by supplying oxygen and hydrogen and taking up the carbon as it is generated from the burning fuel. There are over 5,000 of these furnaces in successful operation, which is sufficient proof that it is no hardship to abate the nuisance, but on the contrary is a matter of economy to consume the gas under the boilers which usually passes off in the form of smoke and soot. Steam users generally speaking, are scattering about 25 per cent. of their fuel over themselves and neighbors. By the use of this device there is no fuel wasted, as all the gas is consumed immediately under the boilers, leaving no soot or sediment to lodge in the flues or stick to the bottom of the boiler, covering the surface of the iron with a non-conducting substance of greater density than asbestos. For further particulars address, W. S. Hutchinson, 6 Washington street, Chicago.



HUTCHINSON'S WATER GAS FURNACE.

THE STEEL RAIL SITUATION.

What few orders come into the market are on requisitions from division superintendents, and rarely exceed 2 000 tons at a time, even with the large trunk lines. Buyers show no interest in the market, being apparently convinced that they have nothing to lose by waiting, since they will probably be able to purchase their track material at current prices later on. Reports from railroad managers indicate that as soon as they have become convinced that a large tonnage must be hauled for the new crops they will be in a position to buy more liberally for repairs. How light the production has been thus far this year is indicated by the report of the Board of Control. The mills in the association, which include all, with the exception of the Colorado works, a small concern relatively, shipped in the aggregate up to June 1st 337,265 gross tons of standard rails. The orders booked up to June 1st figure up 725,376 tons. During May the shipments were 110,000 tons, at which rate it would take more than three months to work off present orders. The indications, however, are that the mills will run fuller in the near future. Last year the deliveries of the mills up to June 1st were 598,000 tons, exclusive of the Allegheny, Bessemer and the Colorado, while the sales footed up to 1,086,000 tons. This year is, therefore, far behind the record of 1890, so that unless there is a very decided change in the market in the next few months the total shipments of steel rails of standard sections from works in the association are not likely to exceed 1,400,000 tons. If we reach this figure the mills will be forced to produce in the second half at a rate more than double of that of the first six months. From present indications the shipments of standard rails will not be much more than 450,000 gross tons by July 1st. These indications have considerable bearing on the pig iron consumption during the second half of the year. Even at a moderate estimate of 1,400,000 tons of rails the consumption of Bessemer pig for that industry must rise to about 1,000,000 tons in the second half, as compared with barely 500,000 tons in the first half year. From the West come reports of somewhat more rapid buying in Bessemer pig during the past few days. Reports in the trade have it that at the last meeting between the coke interest and the Valley furnacemen a leading coke producer offered to take 30,000 tons of Bessemer pig at $16, and that this offer had been accepted in a number of cases. Quotations remain $30.75 @ $31 at tidewater. —[Iron Age.

"Hoorah" for the 4th of July.

The Erie Railway Co. will sell excursion tickets on July 3 and 4 from all stations on the N. Y., P. & O. division. Good returning July 5 and 6. The following are the attractions on July 4; Base ball, two games, Philadelphia vs. Cleveland, balloon ascension and parachute jump, parade of the military companies and the La Crosse game been the Toronto, Canada, and Cleveland clubs. Invite your friends to come.

Chautauqua Lake.

The Erie Railway will sell excursion tickets to Lake Chautauqua on account of Ohio Teachers' Convention, July 6 and 7, at one-half fare ($4.35) for the round trip. Good returning up to and including July 13. Call at 141 Superior street, or at Central passenger station, South Water street and Viaduct.

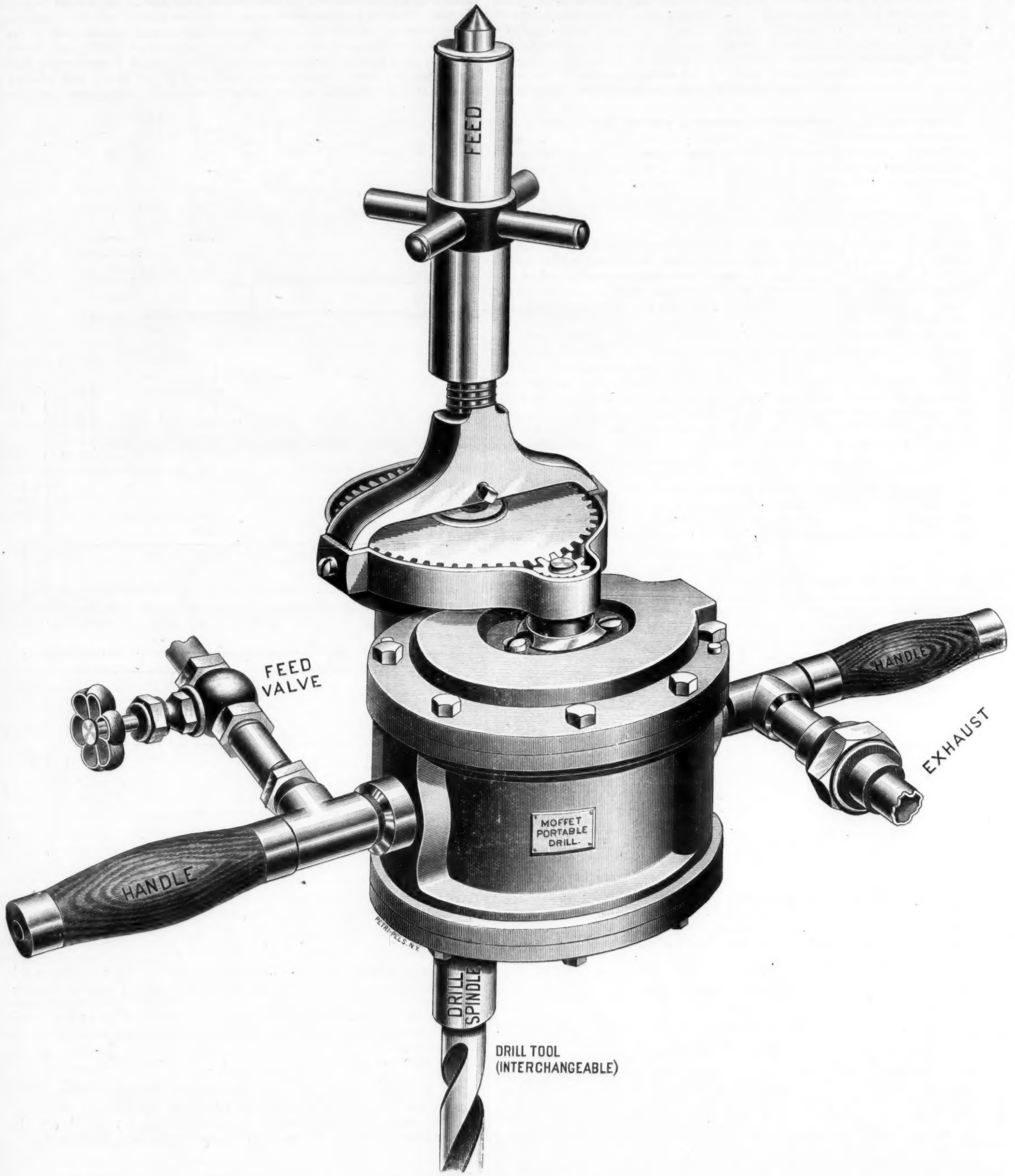
Travel and Fireworks

Are necessary on July 4th. Take the Nickel Pate cheap rate excursions, going July 2d, 3d and 4th, returning until July 7th, 1891.

FOR a quiet day and good time go to Geauga Lake, July 4th. Tickets 50 cents. Good on all trains of the Erie Railway, from Central passenger station, South Water street.

THE MOFFET PORTABLE DRILL.

The Moffet portable drill, of which we give an illustration, is driven by steam or compressed air. It is well adapted for a large class of work which is usually done with a ratchet, and it is attached to the work in exactly the same manner as a ratchet; working equally well in any position. Simplicity of construction, lightness for its capacity, independence of pulleys, belts and shafting, ease of attaching it to a large range of work, and its power, are the principal features which recommend its use. The illustration shows its external appearance. It consists of an elliptical cylinder in which revolves a cast iron circular disk. In this disk there are cut six deep grooves which form guides for cast steel blades. These blades are kept in contact with the inner surface of the cylinder by two cast iron elliptical cams, placed concentric with the cylinder and attached to the cylinder heads (one to each head). As the cast iron disk revolves about the shaft, the cams force the blades outwards, and when they have done their work they are forced inwards by the cylinders. Motion is given to the disk by attaching a ½ inch rubber hose to a nozzle. The steam or air is conveyed through this hose into a steam passage, cast to the side of the cylinder, and from there it passes through the steam ports into each end of the cylinder, and striking the blades, causes the disk to revolve. When the steam has done its duty it is exhausted through the ports, which are in communication with exhaust passages in the heads, and lead the exhaust steam into a passage, and from thence into the nozzle, and it is carried off through a ¾-inch hose.



THE MOFFET PORTABLE DRILL.

A pinion is attached to the shaft, which engages with a wheel, and communicates motion to the drill spindle. The major axis of the cylinder is 5¼ inches; minor axis, 4¼ inches; length of cylinder 4 inches. The blades are 4 inches long, 1⅜-inch wide, and ⅛-inch thick, the total weight of the drill is 42 pounds, and its capacity ranges ⅝ to 1½ inch holes, which may be drilled in steel, wrought or cast iron. For good results the pressure in the cylinder should be at least 45 pounds. With this pressure it is said the tool can be operated, and show working results equal to any drill press. The length of the steam hose will, of course, determine the area in which it can be operated. The speed for different sizes of drills is easily regulated by the feed screw and the feed valve, without reducing the power below a satisfactory point. All joints are made perfectly tight, and the top and bottom bearings in cylinder heads have stuffing-boxes so as to prevent leakage. These drills have been in practical use for about four years, and since they have been introduced upon the market they have been employed for reaming, drilling and countersinking steel and wrought iron in bridge and structural work; heavy machine and vault work; engine and boiler repairs on board of steamers; drilling out rivets; tapping for and screwing in stay bolts, and steamship construction. They are manufactured by J. G. Timolat, 59 S. Fifth avenue, New York.

THE AMERICAN IRON TRADE FROM AN ENGLISH STANDPOINT.

The *Colliery Guardian*, London, after painting the decided curtailment of pig iron production in the United States, gives this interesting study of the situation on this side of the ocean: These causes of this great curtailment of production are not far to seek. In the first place, as we have more than once taken occasion to show, the American iron trade during the last three years has been in an unnatural condition. The productive capacity of American metallurgical industry has been very greatly increased, while, at the same time, the agriculture of the American Union—which, so far as the Western States are concerned, is the main support of the railroad interest, and, by consequence, also of the American rail mills—has been in a weak and languishing condition. Until within the last few months the prices of wheat and maize had sunk to a level which left Western American farmers no return upon their skill and labor; and it was, accordingly, not difficult to see that a check must sooner or later be given to the work of Western American railroad establishment. Notwithstanding this, American industrials were all the while increasing their means of production, the inevitable results being that the iron markets became glutted. Another cause of the great curtailment in production which we now witness in the American iron trade was the comparative weakness observable in the metallurgical centers of Great Britain and Western Europe, principally in consequence of financial troubles in the Argentine Republic. The Argentine authorities have, until within the last few months, been proceeding with great activity—in fact, with too much activity—in the establishment of new railways and other public works; and the result for the time, was a heavy demand for railway *materiel* from Argentina. So long as the credit of the Argentine Government could be maintained, all went well; but for the last six months Argentine credit has been going from bad to worse, until there has now been an almost complete collapse. The effect of this upon the European iron trade has been severe and immediate, and American metallurgy has suffered in sympathy.

The very check which this production of iron has experienced in the United States is, however, calculated to bring about a salutary change in the general position of the American metallurgical industry. Ironmasters are beginning to starve the markets by curtailing their production, this is calculated to steady and strengthen business. In the second place, there has, during the last few months, been a decided improvement in American agricultural affairs. The hard Winter of 1890–1 had the effect of injuring the wheat crops in France, Spain and other parts of Europe. Available stocks of wheat have also been run down to a very low point in the United States, and the result is that an improvement of 10s. per quarter, or thereabouts, has been already established in the price of wheat, with some prospect of a still further rise. This improvement in prices has taken place in spite of the fact that the American growing crops present thus far a highly encouraging appearance. If the anticipations now entertained with respect to the harvest are substantially realized, American farmers will be in the happy position of selling abundant crops at considerably better prices, and this will ultimately improve the demand for iron in the Western States. It is difficult at present to indulge in any hopeful prophecies with regard to the course of affairs in the Argentine Republic. The outlook is as bad as it can well be, and the utmost which can be said is that any change which may take place is likely to be a change for the better. American ironmasters must, then, we think, be content to find their principal elements of hope in reduced production and improved agricultural prospects.

Mitis Castings.

A series of experiments have, says *Indian Engineering*, been conducted in a Rangoon foundry under a system known as the "Osberg patent." Wrought iron scraps were melted down in plumbago crucibles in a special reverberatory furnace fired with petroleum. The crucible is covered and a hole in the cover corresponds with and is directly under a hole on the top of the furnace. Additions to the charge are made through these holes by means of a pipe, thus avoiding the necessity of opening and cooling the furnace. Wrought iron fuses at a certain temperature, till it becomes a fluid ready to cast into moulds and facilitate working before it consolidates. It has been proved that in this system of superheating iron absorbs gases and consequently it is impossible to make castings in this way. But in the new system it is found that certain alloys of metals possess fusing point much lower than that of the metals composing them, and among these aluminum alloys are specially suitable. In making mitis castings a very small quantity of about 1 per cent. of aluminum in the form of 7 or 8 per cent. alloy of aluminum and cast iron is added to about 60 lbs. of wrought iron the moment it was melted. The fusing point is at once lowered about 500°, and the charge of alloy of iron and aluminum becomes extremely fluid and can be cast in the finest moulds, while the melting point gives all the time necessary for manipulating it without danger of its solidifying. The extreme fluidity of the charge allows the ready escape of the gases, which would otherwise make a porous casting, and the result is remarkably fine, solid and tough, and the casting is said to be 50 per cent. stronger than the iron from which it is made.

THE TEN-AND-ONE-HALF-INCH ARMOR PLATE TRIAL.

A decisive test of armor plates is about to be made at the new Indian Head proving grounds. The plates are to be of a thickness of 10½ in. and of the usual 8x6 ft. face. Carnegie, Phipps & Co., of Pittsburgh, are to furnish them. At this trial there will be representatives of the all steel type of plate; the steel and nickel plate of ordinary make and treatment; the all-steel plate treated after the Harvey process; also the nickel plate treated after the Harvey process. It is expected that the Harvey treatment will this time be applied at the Washington Ordnance Yard.

The essential conditions of the Harvey treatment are that the plates shall be so enclosed as to assure an absence of oxygen, a controlled presence of carbon, and an especially high and controlled temperature, such temperature being increased or decreased according to the degree of hardness required when tempered. The higher the degree of temperature to which the plate is originally subjected the higher will be the temper possible to give the metal after treatment. The plate to be treated is carefully bedded in a finely powdered carbonaceous material, preferably hard-wood charcoal, the charcoal or carbonaceous material being inclosed to prevent it being consumed. Different portions or layers of the plate are subjected to different temperatures so as to vary the nature of the several portions or layers, giving them different tempering capacities, yet leaving the whole clean and free from scale or blisters.

The heating process is conducted slowly, to permit the interior portions to be thoroughly and evenly heated to the required temperature. After an assured and thorough heating is accomplished the plate is allowed to cool, care being taken that the heated portions shall be exposed to the air as little as possible, to prevent any oxidizing of the face.

The thicker the plates the longer time is necessary for the heating. The color of the material after cooling defines its capacity for tempering. Thus, if raised to a temperature of 3,000° Fahr. and allowed to cool to a temperature of from 200° to 300° before being removed from the charcoal bed, the material will be found to be quite soft, will show a clean, smooth surface of a gray color, and will be found capable of taking the highest possible temper. Lower degrees of temperature will give different corresponding colors, and different colors will give different tempers. Thus, for instance, a lower temperature will give a gold tint; material of a gold tint will take a temper almost as high as will the gray tint; a still lower temperature will give, when cooled, a pale blue tint, which will be found to take a reduced temper; a temperature as low as 1,500° Fahr, will give, when cooled, a dark purple tint, and a moderately low temper will be the result.

This next plate trial will settle in a great measure the nature and mixture of the armor plates for the new ships. It will be a similar trial to that of last September at the Annapolis proving grounds, except that no foreign-made materials will be used. American-make projectiles of the Carpenter steel pattern fired from American 6 and 8-in. guns are to be used.

The aim and object of all these recent tests has been to ascertain the best possible combination and conditions for attack and defense.

In the preparation of the plates for the coming trial, the best of care and ability will be exerted, and they being all constructed by the same company, there can be but little doubt as to the value of the final results.—[Railroad Gazette.

The Suez Canal.

The report of the British directors of the Suez Canal was issued on April 22 as a Parliamentary paper. The directors observe that the net tonnage for the past year shows an advance of 106,907 tons over that of 1889, and of 249,260 tons over that of 1888, although the number of vessels is actually less by 36 than in 1889, and less by 51 than the number in 1888, thus showing the great increase that has taken place in the average tonnage of vessels using the canal. There is a corresponding increase in the transit receipts, which amounted to 66,984,000f., as against 66,167,579f. for 1889. The tonnage shows a slight reduction in the percentage of Great Britain for 1890, as compared with the two previous years, its net tonnage being 77.37 per cent. of the total. Germany now takes second place, with a remarkable addition to its figures, namely, 7 12 per cent. for 1890, as against 3 58 per cent. for 1888, and 4 27 for 1889. France has fallen back to the third place, with a percentage of 5 31. Holland is fourth, with 3.61 per cent. Italy, Austria-Hungary, Spain and Norway follow in succession, and of other nationalities engaged the percentage is too small to merit special attention. The night passage is steadily on the increase; 83.6 per cent. of the total navigation made use of the electric light for night passage in 1890. In 1889 this percentage was 71 00, and in 1888, 76.7. The mean duration of passage for the combined day and night transit was 21 hours 50 minutes; for the transit by day, 35 hours 29 minutes.

Read This.

If you wish a pleasant day away from the dust and noise of the city, go to Geauga Lake, July 4, via Erie Railway. Tickets 50 cents for the round trip. Good on all regular trains from Central passenger station, South Water street and Viaduct.

A Chance for All

To travel at one fare for the round trip, will be given by the Nickel Plate, July 2d, 3d and 4th, returning July 7th, 1891.

FORGING METALS BY ELECTRICITY.

A committee from the Franklin Institute, Philadelphia, Pa, and a number of newspaper men lately witnessed a very interesting exhibition of forging by electricity at the factory of the Electrical Forging Co., 163 to 169 Oliver street, Boston, Mass., which is thus described by the *Journal of Commerce* of that city. The plant of the company consists of a 60-horse power electric motor, fed from the Edison circuit, driving an alternating current generator, and a special converter in which the electro-motive force can be reduced to a very low voltage and increasing the current up to 12,000 amperes. To this converter is attached the heating apparatus, which at present consists simply of a number of bronze clamps with electrodes of peculiar design and construction, and which holds the piece to be heated. In addition there are a large number of presses, rolling machines, and like apparatus for the production of all the different articles that can be rolled or pressed from a bar of heated metal.

Interest is mostly felt, however, in the machinery that heats the metal. This is capable of giving to the piece to be heated current according to the desire of the operator, and all is within his control. A bar of wrought iron inserted in the jaws of the machine was in a few seconds at a white heat, and finally melted, dropping to the floor a liquid mass. Another piece of steel was heated, one end fastened in a vise and twisted in close spirals throughout its entire length at one heat. Other pieces wound about a mandrel formed a spiral spring at a single heat.

A three-eighths inch rod of steel was heated in a few seconds, beaten into a knife blade, and inserted in a handle within a short time. A square bar of three-fourths inch iron was heated evenly throughout its length and worked into different shapes on the anvil and straightened again at a single heat. Many other interesting tests were made, all showing the rapidity with which iron and steel can be heated by electricity, and heated evenly within any limits desired.

The methods used being comparatively in the earliest stage of development, were necessarily crude, so that the exhibition, it seems to us, was of value more particularly because of the possibilities it opened up. Forging of every description may be done, from that ordinarily given to the blacksmith to work now done at the expenditure of considerable labor and time in specially prepared machines. Its capacity is limited only by the number of dies that can be made for the different articles it is intended to produce. The superiority of the method lies in the evenness with which the whole mass is heated. The blacksmith now heats the outside of his metal to a white heat, while the inside is comparatively cool. Under these conditions the outside rapidly gives off its heat and the work must again be placed in the forge to be reheated for further working. Then the metal is unevenly heated throughout, and when rolled or pressed into various shapes is entirely unreliable because of the unequal internal strains to which it is subjected by the unequal contraction of the article in cooling.

In the electric method the passage of slow alternating currents heats the interior of the iron first. This even temperature is particularly valuable in the tempering of fine tools, and is absolutely necessary. It then becomes a matter of certainty instead of dependence upon the skill and judgment of a single man, probably, in a whole factory. The heating of the metal is so instantaneous that it is only in the path of the current, and the projecting ends are barely warm.

It looked little short of marvelous to see a workman hammering a bar of iron a foot long held in his bare hands, while six inches of the other end was red hot. This merely indicates how readily any desired portion can be heated without affecting the rest, simply because it has not time to conduct the heat, and also showing how free the process is from all those disagreeable things that are inseparable from the present blacksmith's forge or rolling mills. The freedom of the metal from all gases is another advantage, as it can be readily understood that when a piece is heated by a current of electricity no gases are developed, and the metal, whether it be iron, steel, brass or composition, after having been heated by this process, is without scale, which is not possible under any other method.

The question may suggest itself as to the difference between this and the method of heating for electric welding. They are essentially different. In the well-known welding process the two pieces are brought end to end like the opposite poles of an arc lamp, the imperfect contact of the two pieces concentrating the current at the point of greatest resistance, and heating that point at once to the greatest extent. As the ends are pressed together, new paths for the electricity are found until the whole or both ends are heated and forced together until welded. In the method for forging, however, the contact is as perfect as possible and heats the metal by the passage of the electricity through the metal to be heated. The process is the invention of George D. Burton, of Boston. The gentlemen from the Franklin Institute to investigate the matter were Prof. Carl Hering and Prof. Herman Hering, of the Manual Training School, Philadelphia; Prof. Pike, of the University of Pennsylvania; Mr. Billbury and Prof. Spangler.

Get into the "Swim of Touch."

Are you "in touch" with the times? If so, you ride on the front seat of the wagon of progress. If not, you are at the tail end of the procession—trudging along somehow. Are you a manufacturer of woodwork, and do you want "to get there?" Then by all means get into communication with the famous Egan Co., of Cincinnati, O. They are in the "swim of touch" with the best mechanical ideas to produce fast, perfect and economical work.

July 4th Excursions.

The Erie Railway Co. will sell excursion tickets to and from all stations on the N. Y, P. & O. division July 3d and 4th, returning July 6th, at one fare for the round trip.

PRACTICALLY DEMONSTRATED.

THE HACKNEY POWER HAMMER

is meeting with DESERVED SUCCESS, and an investigation as to its principle of operation and construction will convince anyone beyond question of its superiority in every respect over the old-fashioned-helve rubber cushioned-leather strap-awkward belt tightener power hammers sold to-day. All such old fogy and frail appliances are done away with in the "HACKNEY," and the purchaser gets for his money a vastly more EFFECTIVE and DURABLE HAMMER.

That the "HACKNEY" is far ahead of any other power hammer in the market is PRACTICALLY DEMONSTRATED, and we have strong testimonial letters from leading firms throughout the country who have used them.

Write for Illustrated Catalogue with Description and Prices.

THE HACKNEY HAMMER CO., Cleveland, Ohio.

INDUSTRIAL SUMMARY.

New Enterprises.—

The Hutchins Machine Co. have been incorporated at Worcester, Mass., with a capital stock of $25,000.

The Wheeland Automatic Fire Escape Co. is a new concern organized at Chicago, Ill., to manufacture fire escapes on the Wheeland patent. Capital, $250,000.

A company has been incorporated at Jacksonville, Fla., under the style of the Acme Water Lift Co., to manufacture the Acme water lift and other machinery.

The old Gephart Foundry & Machine Shops at Cumberland, Md., have been leased by a Pittsburgh firm, who, it is reported, will manufacture electrical supplies.

The John E Bregga Machinery & Supply Co. filed articles of incorporation at Patterson, N. J. The capital stock of the company is $25,000, of which $10,000 is paid in.

Business men of Susquehanna, Pa, have decided to organize a stock company with a capital of $25 000, for the purpose of purchasing the Sperl plant and manufacturing steam heaters.

John H. Collins, boiler maker at Amsterdam, N. Y., contemplates the purchase of a lot near his present shops, and will, when the purchase is consummated, build shops 100x50 feet.

A new foundry and rolling mill is to be established by Weber Bros. of Kansas City, at Clinton, Mo. The main building will be 60x150 feet, and the work of erection will be begun at once.

The National Malleable Iron Co., of Peoria, Ill., has been incorporated, to manufacture malleable iron and machinery. The capital stock is $100,000. The incorporators are: A Henry, A. C. Angler and Geo. A. Willson.

The Danville Foundry & Machine Co., Danville, Ill., has been incorporated to do a general foundry and machine manufacturing business; capital stock, $75,000. The incorporators are: Wm. Stewart, Mary Stewart and L. A. Chesley.

A recently organized corporation in Illinois is the Holmes & Pyotts Co., Chicago, to manufacture and use iron and its products for building and machinery purposes; capital stock, $300,000. The incorporators are, Edward B. Holmes, James M. Pyott and David Pyott.

The East Lebanon Iron Co. have been formed at East Lebanon, Pa., to erect a rolling mill at that place. The capital of the company is $100,000. N. E. Legat is President, and the remainder of the directory is composed of H. O. Nully, James E. Legat, J. R. Beckley, Daniel S Light, J. B. Irish and H. T. Atkins.

Frank C. Douds & Co., machinists and dealers in small supplies of all kinds, have recently purchased a site of land at New Castle, Pa., on which they propose erecting a strictly fire-proof machine shop, warehouse, engine and boiler room, offices, etc. The buildings will be of stone, brick and iron, and will probably be completed the latter part of this year.

F. A Marriott, Richard Wooley, Jr., and E. J Adams are the proprietors of the newly-formed Ivanhoe Rolling Mill & Iron Co., whose works are to be located at Ivanhoe, Ind, on the Michigan Central Railroad. The plant of the Western Iron Co., in Kansas, near Kansas City, is to be removed to Ivanhoe. Over 1,000 feet of side track have already been laid for the new company, and material for the buildings is already on the ground. The company have secured a tract of 40 acres for their works.

The following new companies have filed articles of incorporation with the Secretary of State, Illinois: The American Fifth Wheel Co., of Chicago; capital stock, $35,000; incorporators, E. C. Hart, C. F. Hart and P. E. Crissey. —The American Mechanical Co., of Chicago; capital stock, $50,000; incorporators, E. S Averill, O. J. Price and H S. Park.—Avery & Rouse Steam Thresher Co., of Peoria; capital stock, $300,000; incorporators, R. H. Avery, M. Avery, C. W. Freeman, S. B. Hazard and H. G. Rouse.—The Gaston Electrical Manufacturing Co., of Sparta; capital, $125,000; incorporators, J E. Gaston, D. P. Barker and R. H. Roseborough.—The American Bicycle & Specialty Co., Chicago; capital, $100,000; incorporators, R. N. Simpson, George Johnson and H. Bowman.—The Sportsmen's Novelty Co., Chicago; capital, $30,000; incorporators, C. E Felton, J. J. Grey and J. J. Felton.

Additions, Enlargements, Removals, etc.:—

The Gem Furnace Co., Leesburg, Va., is reported as building a rolling mill.

The Paige Tube Co., at Warren, O., will add a foundry to its already large plant.

The Marshall Furnace Co., of Newport, Pa., is to erect a foundry in which to engage in the business of casting articles in iron from the molten metal as

it runs from the furnace cupola. The company has been experimenting upon this kind of work for some time, and while the experiments were not entirely

It is reported that the Union Pacific will build extensive repair shops at Ogden, Utah.

An addition is to be built to the plant of the Hoskins & Hinnerth Foundry Co., at Highgate, Vt.

The business of the Lamprey Machine Co., of Lake Village, N. H., will be removed to Cambridge, Mass.

The Hendrick Manufacturing Co , of Carbondale, Pa., has broken ground for a new machine shop 140x40 feet.

Charles Hillman & Co., shipbuilders at Philadelphia, will add a two-story machine shop to their plant, 206x40 feet in dimensions.

At Battle Creek, Mich., the Battle Creek Machinery Co. are increasing their plant by the erection of a building 40x50 feet as an addition to the present works.

The Stgourney Tool Co., Hartford, Conn., are erecting an addition to their machine shop, which will be ready about July 1. The extension is 85x32 feet, two stories high, of brick.

successful, enough was learned to warrant the company's action

It is reported that the managers of the Glasgow Iron Co., at Pottstown, Pa., have authorized their executive committee to take steps looking to the removal of the entire plant to a point in the western part of that town lying between the Philadelphia & Reading and Pennsylvania railroads. On this site the company own 23 acres of ground, on which their valley mill is located, formerly known as the Glasgow Steel Works.

Fires and Accidents:—

The Missouri Car & Foundry Co. lost $20,000 by the burning of their shops in St Louis, June 12

The foundry of McKeown & Co., at Jefferson, Tex , has been burned at a loss of $20,000; insurance $6,000.

General Industrial Notes:—

W. J. Burton & Co., Detroit, Mich, have just issued a handsome little descriptive catalogue of their well known "Eastlake" metal slates for roofing and siding.

The Lewis Foundry & Machine Co , of Pittsburgh, Pa., have received a contract to furnish the Monlevard Iron Co., of Rio Janeiro, Brazil, with a 10-in. iron rolling mill and the necessary equipment of machinery. This is claimed to be the first rolling mill machinery ever constructed in this country for shipment to Brazil.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until 2 o'clock, P. M., on the 9th day of July, 1891, for all the labor and materials required to put in place, complete the iron floor, ceiling and roof construction, copper work, etc , for the U S. Post Office, Court House, etc , building at Charleston, S. C.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., till 2 o'clock, P M., on the 6th day of July 1891, for the labor and materials required for furnishing and putting in place complete, the low-pressure, return-circulation, steam-heating and ventilating apparatus, for the United States Court House, Post Office and Custom House building at Vicksburg, Miss.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C, until 2 o'clock, P M., on the 14th day of July, 1891, for all the labor and materials required for the excavation, concrete foundations, stone and brick masonry, iron work of floors, roof covering, brick and terra cotta work, iron stairs, drain pipes, approaches, etc., for the U. S. Court House, Custom House and Post Office building, at Duluth, Minn.

The Cleveland Wheelbarrow & Manufacturing Co., S. D. Wright, President and Superintendent, J. W. Hornsey, Secretary and Treasurer, manufacturers of "Cleveland" wheelbarrows, trucks, pounders, mauls, hods, etc., has purchased the business, including all real and personal assets of the Cleveland Wheelbarrow & Truck Co. The transfer will not affect the business in any way, the only change being the retirement of Mr. E F. Wright, who has been succeeded by Mr. J W. Hornsey.

The companies here given last week placed orders for the equipment of their plants with Neracher sprinklers, with the Neracher Sprinkler Co., Warren, O: Pantasote Leather Co., Passaic, N. J.; Peter Woll & Sons, Philadelphia, Pa; S. S. White Dental Manufacturing Co., Philadelphia, Pa.; Enochs Brothers, Jackson, Miss.; Fernwood Lumber Co., Fernwood, Miss.; Louisiana Sugar Refining Co., New Orleans, La.; Planters' Sugar Refinery Co., New Orleans La; E. O. Mathiessen & Wiechers Co., Jersey City, N. J; A. Crofford, San Francisco, Cal.; Preston & McKinnon, San Francisco, Cal.; Washington Jute Mills, San Francisco, Cal.; Oakland Jute Mills, Oakland, Cal.; Washington Mill Co., Haddock, Wash.; Leonard & Atkinson, De Kalb, Ill.; Reedsburg Woolen Mills, Reedsburg, Wis.; Diamond Match Co., Oshkosh, Wis. Last month's sales of Neracher sprinklers far exceeded that of any previous month since they have been in business, and they report that contracts closed in that time aggregated $240,000.00. This argues well for the Nerarcher Co., and goes to show that manufacturers are fast awakening to a realization of the merits of automatic protection, and that they are losing no time in placing orders for equipments.

Lake Chautauqua, the Queen of Summer Resorts

At a lake of cool crystal water, located among the beautiful highlands of the Empire State, 150,000 people seek each Summer season the delightful rest always found in that wholesome atmosphere. Chautauqua: the famous resort! located between 1,400 and 1,500 feet above the ocean, whose facilities for boating, fishing and bathing are unsurpassed, and combine these pastimes with the advantages made possible through the educational and religous organizations, which make Chautauqua Lake their Summer headquarters, is it suprising that each season, thousands frequent its shores?

With hotel accommodations capable of delighting the tastes of the most fastidious, and boarding houses where families may secure commodious rooms and excellent service at reasonable rates, should it be wondered at that people flock from the smoke, dust and heat of our cities to enjoy the pleasures and benefits obtainable on the shores of this lake of springs.

Tourists selecting the Nickel Plate route to this queen of Summer resorts will find accommodations desirable in every appointment. Excellent connection is made for Chautauqua Lake, at Brocton Junction, N. Y., and from Mayville, N. Y., any point on the lake may be reached via boat or rail. Passengers holding tickets via the Nickel Plate to Niagara Falls, may secure stop-over at Chautauqua free of charge.

Be sure your tickets read via the Nickel Plate.

Steel Pipes

The Steel Pipe Co., of Kirkaldy, have done something toward showing the advantages possessed by steel over wrought iron pipes. It is stated by Mr. D. J. Russell Duncan, Assoc. M Inst. C. E., that wrought iron or steel pipes can be produced at a less cost per unit of length than cast iron pipes. A pipe built of steel can be made at a less cost of labor than one of wrought iron, on account of the reduction in the number of plates and rivets, and, therefore, of calking and punching. Being less liable to corrosion than pipes of wrought or cast iron, the durability of steel is insured. It is stated by one authority that the best precaution is to have the pipes galvanized, then coated with natural asphaltum or with a composition of pitch, tar, petroleum, linseed oil, and chalk. This solution is heated in a bath to a temperature of 250°, and the pipes immersed till they acquire the same temperature as the composition. The pipes should also be coated as they are laid in the trench. As regards strength, the steel pipe is much superior to glazed stoneware or cast iron, or about three and a half times stronger than the latter. Mr. Duncan says: "As steel is on an average 1 3 times stronger than wrought iron, it is clear that for pipes of equal strength of plate, and allowing that the riveted or welded seams are of equal strength on both, the thickness of mild steel need only be about 0 77 of the thickness of wrought iron." This economy of material can be effected by using open-hearth mill steel of the highest possible tensile strength

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Tempering Tools.

The following is said to be the Swiss method or hardening cast steel for cutting tools. Mix in a suitable vessel four parts of pulverized resin and two parts of train oil. Stir well in this one part hot tallow. Into this mixture the article to be hardened is plunged at a low red heat, and held there until thoroughly cooled. Without cleaning off, the piece is again put into the fire and suitably tempered in the ordinary way. An examination of the steel thus hardened indicates that the hardening is deeper and more uniformly distributed than is commonly the case, and that the steel is less brittle. Articles thus hardened have excellent and durable cutting qualities.—[Stone

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Ohio State Teachers' Association.

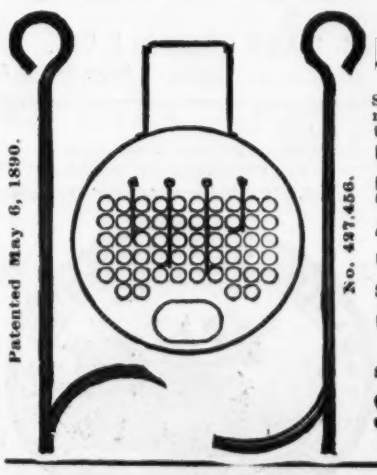
The Nickel Plate will sell excursion tickets to Chautauqua Lake from July 2nd to 7th, inclusive, at rate of one fare for the round trip. Tickets good returning until July 13th.

Celebrate the Fourth

By going to some of the many delightful spots and shady nooks on the Nickel Plate. July 2d, 3d and 4th. One fare for the round trip.

Either Direction and Any Place.

One fare for the round trip on the Nickel Plate July 2d, 3d and 4th. Fourth of July excursions.



TO USERS OF TUBULAR

BOILERS

Why you should use Bauer's External Flue Scraper, as it is the only known device that removes the scale and sediment from the outside of the flues.

B. 1st. Removes scale from the external surface of the flues.
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C 3d Gives absolute protection to flues from scaling.
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U 5th It will save its price the first time it is used.
S 6th A set should be in the hands every engineer.
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Send for circular of both the Scraper and of our Sensible Automatic Packing.

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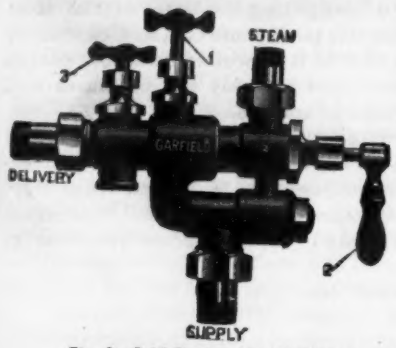
WADSWORTH, O.,

—MANUFACTURERS OF—



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AND
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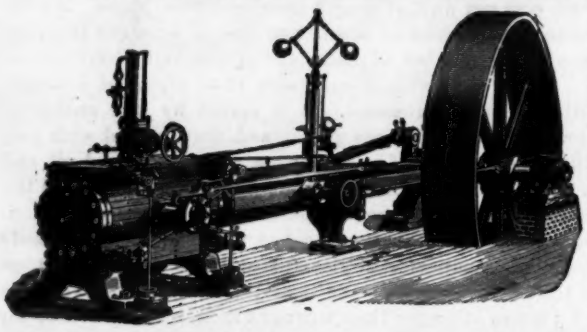

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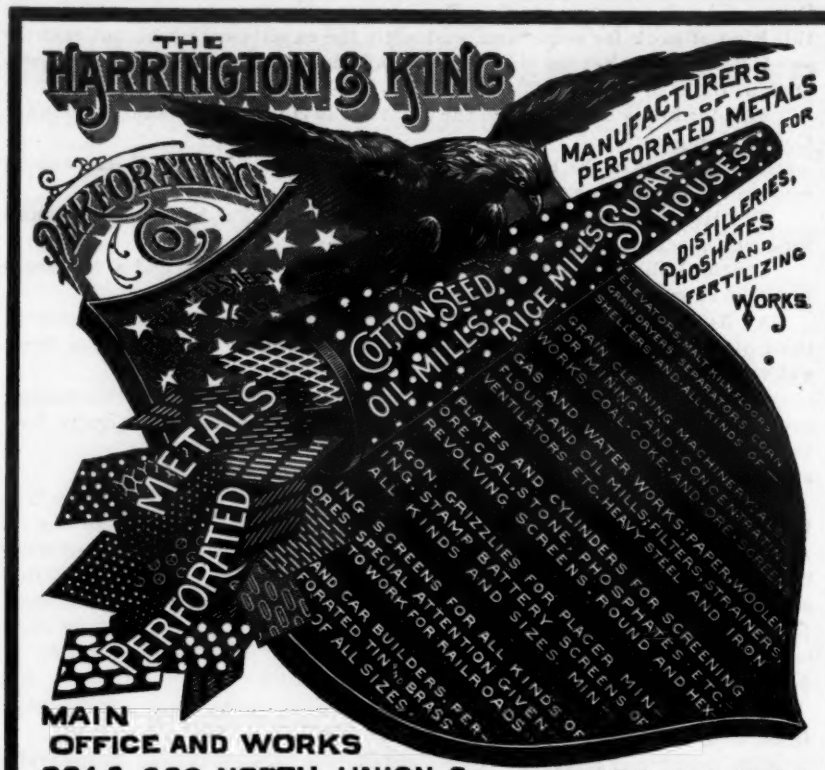

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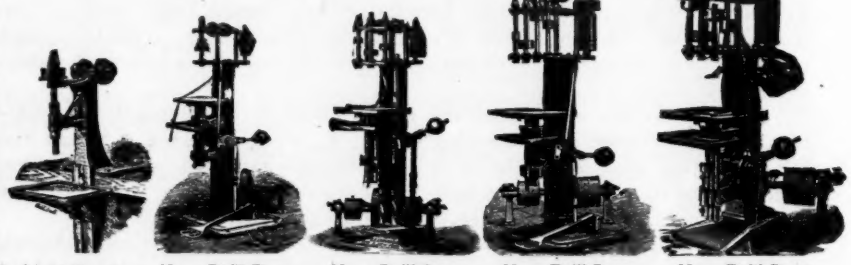

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OLD FILES RE-CUT.
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FROM 1-4 TO 15,000 LBS. WEIGHT.
True to pattern, sound, solid, free from blow-holes and of unequaled strength.
Stronger and more durable than iron forgings in any position, or for any service whatever.
60,000 CRANK SHAFTS and 50,000 GEAR WHEELS of this steel now running prove this.
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Steel and Wire Hangers, Etc.

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CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 25@16 00; Southern Coke No. 3 Foundry, $15 00@15 75; Southern Coke No 1, Softeners, $15 25@16 00; Southern Coke No. 2, Softeners, $14 50@15 25; Ohio Silveries No. 1, $17 75@18 75; Ohio Silveries No. 2, $16 75@17 75; Ohio Strong Softeners No. 1, $18 00@19 00; Ohio Strong Softeners No. 2, $17 25@18 25; Lake Superior Charcoal Nos. 1 to 6, $17 75@18 50; Tennessee Charcoal No. 1, $18 00@19 00; Tennessee Charcoal No. 2, $17 00@18 00; Southern Standard Car Wheel, $21 00@23 00; Tennessee Standard Car Wheel, $00 00@00 00.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 00@15 25; Hanging Rock Coke, No. 1 foundry, $16 50@17 50; Jackson Co. Stone Coal, No. 1 foundry, $16 50@17 00; Tennessee Charcoal, No. 1 foundry, $16 50@17 50; Hanging Rock Charcoal, No. 1 foundry, $20 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $12 75@13 25; Standard Southern Coke, mottled, $12 50@12 75; Cold Short Southern Coke, grey forge, $12 75@13 00; Strong Ohio Neutral Coke, grey forge, $15 00@15 50. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $19 50@20 50; Tennessee Car Wheel, $18 00@19 00; Lake Superior Car Wheel, $19 50@20 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 00@00 00; Mahoning and Shenango Valley strong, No 2 Foundry, $16 00@00 00; Ohio Softener No. 1, $17 00@00 00; Ohio Softener No. 2, $16 00@00 00; Jackson Co., Silvery No. 1, $18 25@00 00; Jackson Co. Silvery, No. 2, $17 25@00 00; Lake Superior Charcoal, $18 00@00 00; Tennessee Charcoal, $18 00@19 00; Southern Softener No. 1, $16 25@00 00; Southern Softener No. 2, $15 50@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 25@00 00' Alabama Car Wheel, $22 00@22 50; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 50; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 00@17 50; Missouri charcoal, No. 2, $16 50@17 00. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $19 50@21 00; Southern (other brands), $17 50@18 00; Lake Superior, $20 50@21 50.

ST. LOUIS (reported by Rogers, Brown & Meacham): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@15 75; Southern Coke No. 2, $14 75@15 00; Southern Coke No. 3, $14 00@14 25; Southern Grey Forge, $13 50@13 75; Southern Charcoal No. 1, $17 75@18 00; Southern Charcoal No. 2, $17 25@17 50; Missouri Charcoal No. 1, $15 50@16 00; Missouri Charcoal No. 2, $15 00@15 50; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $20 00@20 50; Southern, $19 00@21 00. CONNELLSVILLE COKE—East St. Louis, $0 00; St. Louis, $0 00.

DETROIT (reported by William F. Jarvis & Co): Lake Superior Charcoal, all Numbers, $18 00@18 50; Lake Superior (coke) Bessemer, $18 00@18 50; Katahdin (Maine charcoal), $00 00@00 00; Lake Superior Coke, Foundry, all ore, $18 00@18 50; Lake Superior Coke, Foundry, all ore, $00 00@00 00; Standard Ohio Black Band, $18 00@18 25; Southern No. 1 $16 25@16 50; Southern Gray Forge, $14 00@14 50; Jackson County (Ohio) Silvery, $18 00@18 50; Old Car Wheel, $00 00@00 00. Connellsville Coke, $0.00.

LOUISVILLE (reported by Geo. H. Hull & Co): Southern Coke No. 1 Foundry $14 50@14 75; Southern Coke No. 2 Foundry $13 75@14 25; Southern Coke No. 3 Foundry $13 25@13 75; Grey Forge, $12 75@13 25; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $19 00@20 00.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $16 00@16 25; No. 2 Foundry, $15 00@16 25; Grey Forge, $14 00@14 25; White and Mottled, $13 00@13 50; Warm Blast Charcoal, $18 00@20 00; Cold Blast Charcoal, $22 00@27 00; Bessemer, $15 75@16 00.

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1½ to 4 by ⅜ to 1 inch	1 80
4½ to 6 by ⅜ to 1 inch	1 90
1½ to 6 by 1¼ to 2 inch	2 20
1¼ & 1¾ by ⅜ to ¾ inch	1 90
1 & 1¼ by ⅜ to ¾ inch	2 00
⅝, ¾ and ⅞ by ⅜ to ⅞ inch	2 20

Round and Square.

1 to 1⅜ inch	1 80
2 to 2¾ inch	2 00
2¾ to 3¼ inch	2 30
3¼ to 4 inch	2 80
4¼ to 4½ inch	3 30
4¾ to 5 inch	3 50

Oval.

⅜ to 1¾ inch	2 20
½ to ¾ inch	2 40
⅞	2 60
⅝	3 00

Half Oval and Half Round.

1¾ to 3 inch	2 90
⅜ to 1¼ inch	2 50
½ to ¾ inch	3 10
⅞	3 30
¾	4 80

Heavy Band.

⅛ to 6 by ¼ and 5-16 inch	2 00
¼ to 1¼ by ¼ and 5-16 inch	2 10
¼ to ⅜ by ¼ and 5-16 inch	2 30
⅜ to ¼ by ¼ and 5-16 inch	2 80

Hoops.

1¼ to 4, Nos. 13 to 15	2 60
1¼ to 2, Nos. 16 to 18	2 70
1¼ to 2, No. 19	2 80
1¼ to 2, No. 20	2 90
1¼ to 2, No. 21	3 00
1¼ to 2, No. 22	3 10
15-16, 1 and 1⅛, Nos. 13 to 15	2 80
15-16, 1 and 1⅛, Nos. 16 to 18	2 90
15-16, 1 and 1⅛, Nos. 19 and 20	3 00
15-16, 1 and 1⅛, No. 21	3 10
15-16, 1 and 1⅛, No. 22	3 20
⅞, Nos. 13 to 15	3 00
⅞, Nos. 16 to 18	3 10
⅞, Nos. 19 and 20	3 20
⅞, No. 21	3 30
⅞, No. 22	3 40
13-16, Nos. 13 to 15	3 20
13-16, Nos. 16 to 18	3 30
13-16, Nos. 19 and 20	3 40
13-16, No. 21	3 50
13-16, No. 22	3 60
¾, Nos. 13 to 15	3 30
¾, Nos. 16 to 18	3 50
¾, Nos. 19 and 20	3 60
¾, No. 21	3 70
¾, No. 22	3 80
11-16, Nos. 13 to 15	3 50
11-16, Nos. 16 to 18	3 70
11-16, Nos. 19 and 20	3 80
11-16, No. 21	3 90
11-16, No. 22	4 00
⅝, Nos. 13 to 15	3 80
⅝, Nos. 16 to 18	4 00
⅝, Nos. 19 and 20	4 10
⅝, No. 21	4 20
⅝, No. 22	4 30
⅝, No. 23	4 50

Light Band.

1¾ to 6 by 1/16 to 3-16 in	2 20
1¾ to 6 by Nos. 11 and 12	2 30
1 to 1¾ by 1/16 to 3-16 in	2 40
1 to 1¾ by Nos. 11 and 12	2 50
⅜ and 13-16 by 1/16 to 3-16 in	2 70
⅜ and 1 3-16 by Nos. 11 and 12	2 80
⅜ and 11-16 by 1/16 to 3-16 in	3 00
⅜ and 11-16 by Nos. 11 and 12	3 10
½ and 9-16 by 1/16 to 3-16 in	3 30
½ and 9-16 by Nos. 11 and 12	3 40
⅝ by ⅛ to 3-16 in	3 60
⅝ by Nos. 11 and 12	3 70

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12	2 80
⅜ inch, " " " 13 and 14	3 00
½ inch, " " " 11 and 12	3 10
½ inch, " " " 13 and 14	3 30

Sheet Iron:

No. 10 to 14	2 65
No. 15 to 17	2 75
No. 18 to 21	2 99
No. 22 to 24	3 15
No. 25 to 26	3 30
No. 27	3 40
No. 28	3 50

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 60
C No. 1, " "	2 85
C H No. 1 " "	3 10
C H Flange, " "	3 85
Extra Flange, "	4 35
Solid Fire Box "	5 10

Steel Boiler Plates—1-4 in. and Heavier.

Tank	2 75
Shell	3 15
Flange	3 45
Marine Flange	3 85
Fire Box	4 55

Above includes plates 90 inches wide.

90 to 96 in. wide	½c lb extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1½c "
104 to 116 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅝ and 2⅝ to 3 in	10½
3⅛ to 4 in	11
⅝ to 11-16 and 4⅛	10½
⅛ to 6 in	11½
¼ to 9-32 and 6⅜ to 7 in	12
3-6 in	14

Flats.

	cts. lbs
2 to 9-16 wide by 2 to ⅝ thick	9

Bessemer and O. H. Steel.

Machinery	base price,	2 75
Tire	"	2 75
Spring	"	3 25
Sleigh Shoe	"	2 75
Toe Calk	"	3 00
Cutter Shoes, tapered and burr.	"	3 00

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Jessop's	16c
Hobson's "Best"	16c
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⅛, ⅝, 11-16 and ¾ inches diameter	4 00
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Grate Bars	8 00
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Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
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Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	12 00

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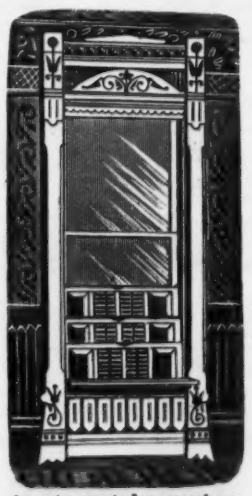

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American.....₩ lb 9@10
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Blacksmiths' { Hill's.....dis 40
Bullock's.....dis 50&10
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Hand.....dis 40&10@50

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Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single, ...dis 40
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Boston Blower Co.,.....dis 35
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White.....₩ gross 50
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Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 3 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
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Almond Drill.....dis 20
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" Independent Lathe.....dis 40
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Pratt & Whitney.....dis 10@15
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Iron, steel points.....₩ lb 3½

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Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¼".....dis 50&10
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Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
¼ kegs ₩ lb	4¼c	5¼c		2¾c
½ kegs ₩ lb	4½c	5½c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7¼c

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Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	2½	3½
Hexagon	15½	11¾	8½	6	5½	5½	5
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire.

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30
{ Less than car lots$2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15½
Sisal, ¼ inch and over .....₩ lb 13½

Sand Paper.

B. A. & Co.....dis45@50
H. H. Barton's.....dis40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@10
" *Band.....dis 1c
" Scroll .....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 30
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 33c "
No. 1 Handles.....dis 25c per pair
No. 6 " .....dis 10c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay .....dis 45

Screws.

Wood Screws—New List 1890.

Flat head iron.....dis 72½
Round head iron.....dis 67½
Flat head brass.....dis 72½
Round head brass.....dis 65
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅜ lb Balls		21c@29c
No. 18 " " ¼ and ⅜ "		18c@28c
No. 36 " " ¼ and ⅜ "		16c@27c
2-Ply Hemp, ¼ & ⅜ lb Balls (Spring Twine		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11¾c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 25

Wire.

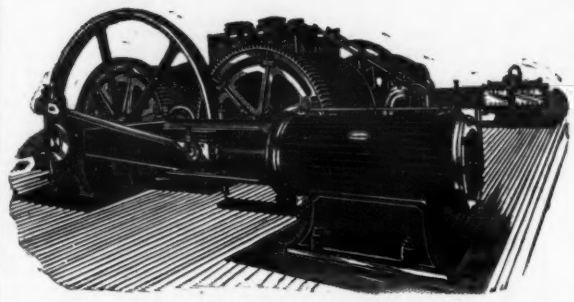
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " ".....dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00 ₩ lb dis 5

Wrenches.

Coe's genuine, ...dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 5
Bemis & Call's Combination .....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 50

Webster, Camp & Lane Machine Co.



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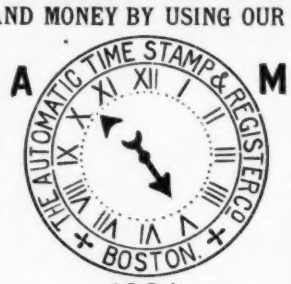

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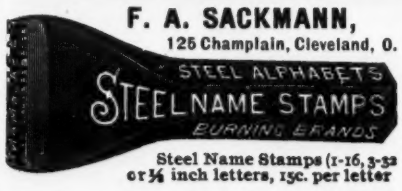

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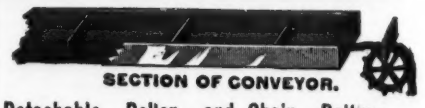

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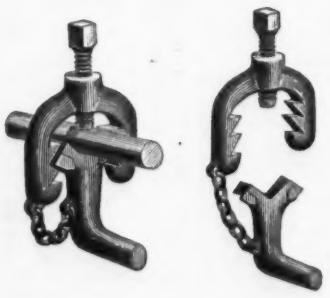

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" 3 " 1 to 3¼ " " 3 50
Price, per set of three, to take from ¼ to 3¼ in. 7 50

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Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $7 00
Others.....℔ doz $6 00
Full polished.....℔ doz $8 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10

Sargent's list

Carriage, common, new list.....dis 75&10
Tire, common, new list.....dis 65
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

Carbonized Felt and Building Papers.

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Eberts Bros., Detroit.	Per roll of 500 sq. feet.
No. 1—Slaters'.....	$1.25
"A," Stringed Roofing, Light.....	1.50
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Stringed, Rosin-Sized.....	1.00

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Asphaltum, Trinidad Refined, ℔ ton.....$30.00
Asphaltum, Fine Grade, ℔ lb.....08
Coal Tar Felt, 1 Ply, ℔ lb.....02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft.....1.85
Roofing Pitch, ℔ gal.....09

Chains.

Revised List.

Trace, 6¾-10-2.....℔ pair 1.03
Trace, 6¾-10-3.....℔ pair .92 .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanised Pump Chain.....℔ D5¾@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Ars, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10½ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11¾ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 55
Scranton.....dis 33⅓
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ℔ lb.	23	24	25	26	28	dis 40
Putnam, ℔ lb.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hemacite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronse Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronse.....dis 60&10
Butts', genuine bronse.....dis 60&10
Butts' bronse plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronse.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronse.....dis 70
Shutter knobs, genuine bronse.....dis 50
Shutter bars, genuine bronse.....dis 60
Sash lifts, genuine bronse.....dis 60
Sash pulls and plates, genuine bronse.....dis 60
Push plates, genuine bronse.....dis 60
Drawer pull, genuine bronse.....dis 70
Letter box plates, genuine bronse....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$4....dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ doz $18 dis 25

Squares.

Steel and iron, Nickel plated.....dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10
American iron cut tacks.....dis 77½&10
Copper tacks.....dis 40&10
Copper finishing and trunk nails.....dis 50&10
Cigar box nails.....dis 50&10
Finishing nails.....dis 60&10
Hungarian nails and miners' tacks...dis 60&10
Gimp and lace tacks.....dis 77½&10
" " " tinned.....dis 60&10
Trunk and clout nails.....dis 72½&10
Tinned trunk&clout nails.....dis 66&10
Basket nails.....dis 66&10
Chair nails.....dis 66&10
Common and patent brads.....dis 66&10

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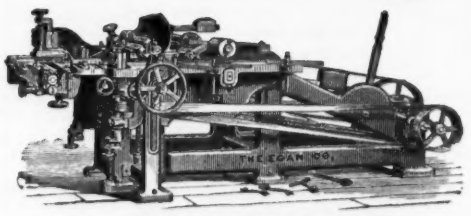

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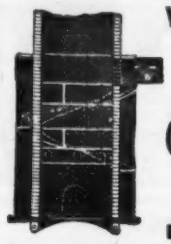

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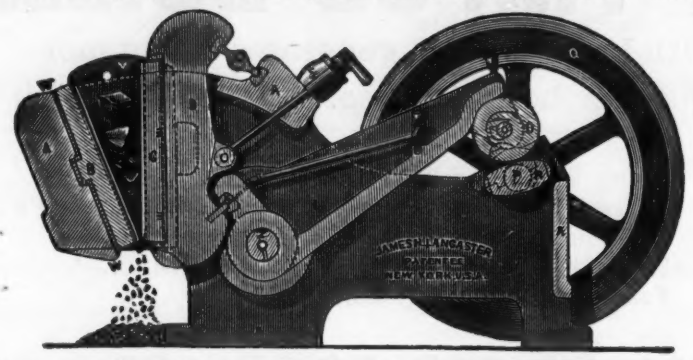

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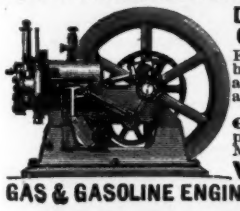

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(Standard Gauge.)

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Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

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Zanesville and Coshocton—10:30 a. m.,6:30 p m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

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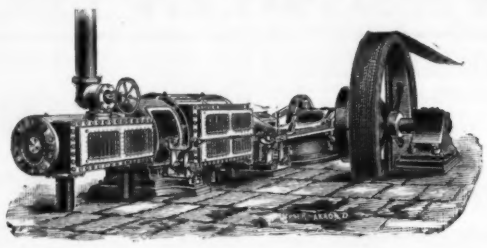

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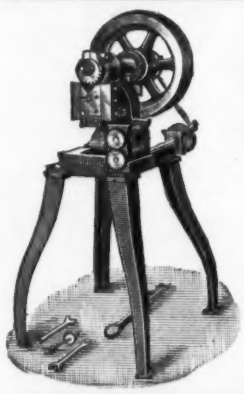

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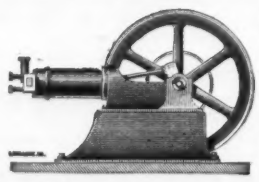

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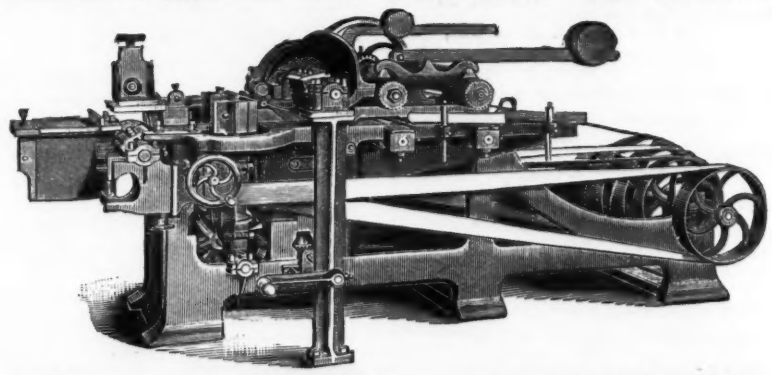

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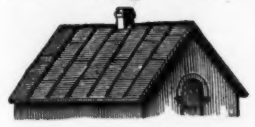

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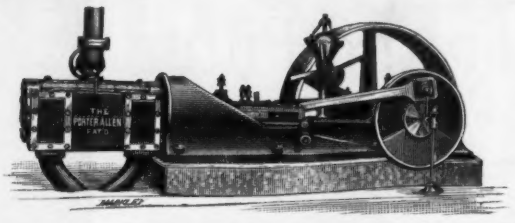

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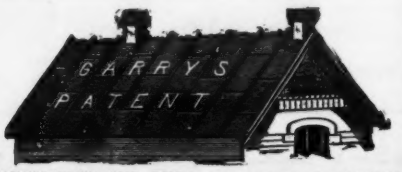

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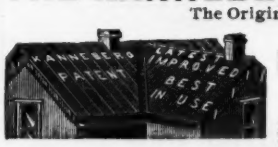

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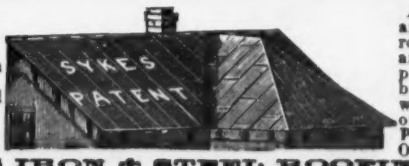

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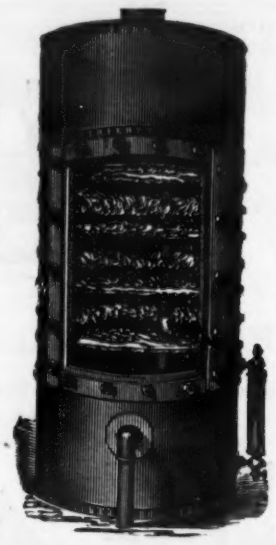

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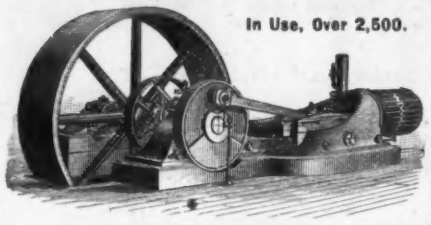

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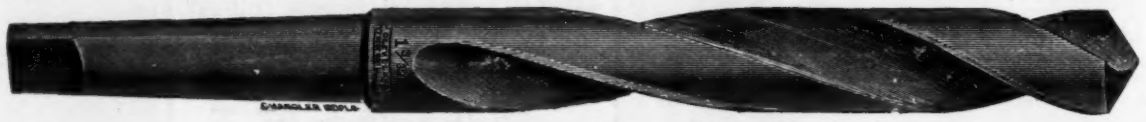

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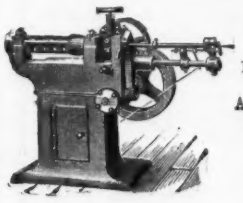

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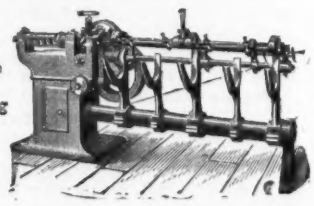

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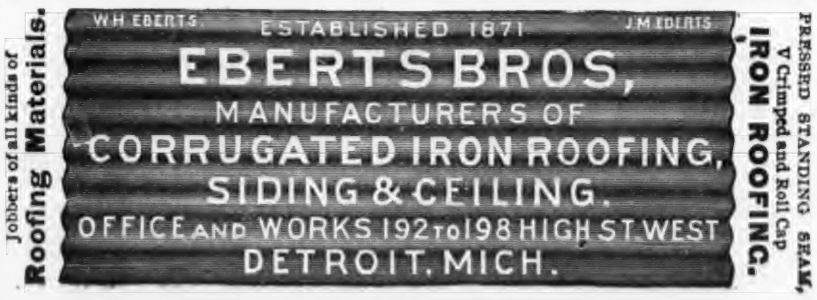
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